Base Load Power Hub (BLPH)

Lighting Calculation Study Report

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Rev.	Description
00	Issue for Review (IFR)
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1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

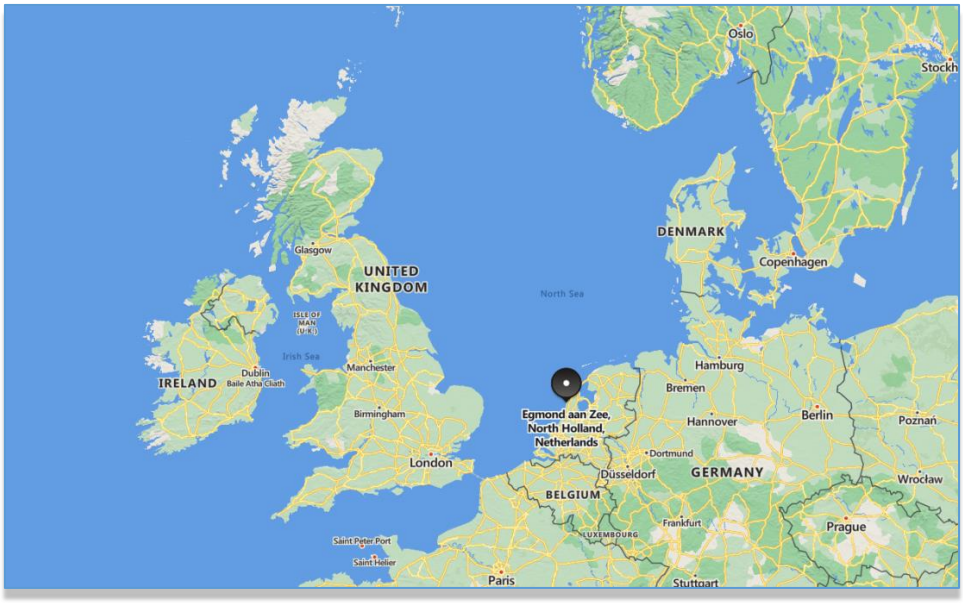


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

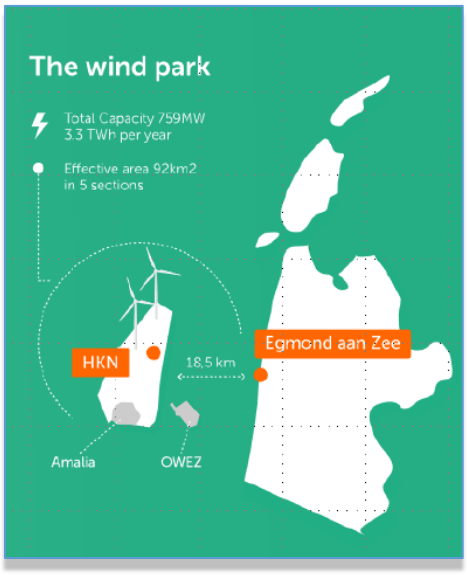


Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

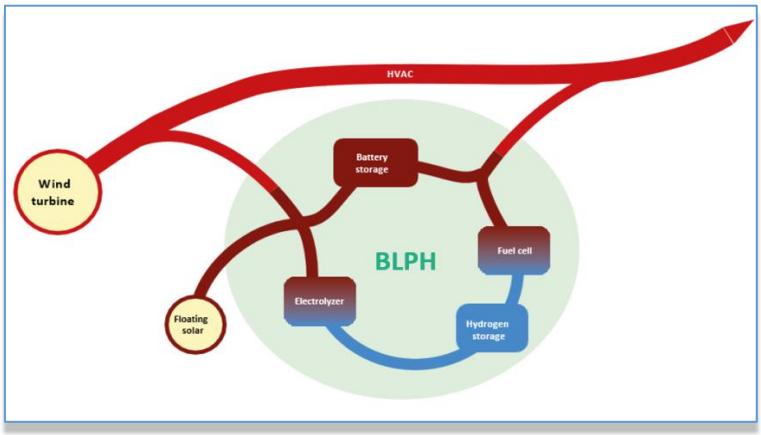


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

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2 DOCUMENT SCOPE

The purpose of this specification is to cover the lighting design parameters to be used in determining the illumination levels obtained and the number of fittings to be installed on BLPH.

2.1 REFERENCES

Doc. No.	Description
123A90-DDL-EL-SP-20085	Technical Specification for Electrical Requirement in Packaged Units
123A90-DDL-EL-DD-20091	Electrical Typical Installation details - Lighting System
123A90-DDL-EL-DG-20125	Lighting & Socket Circuit Diagram - Top Deck
123A90-DDL-EL-DG-20126	Lighting & Socket Circuit Diagram - Lower Deck
123A90-DDL-EL-DG-20127	Lighting & Socket Circuit Diagram - Below Lower deck
123A90-DDL-EL-DS-20064	TDS - Lighting Fixtures & Accessories

Table 1 - Reference Documents

2.2 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	CROSSWIND
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project
INSPECTION AUTHORITY:	The organization representing the Owner or Vendor /Contractor that verifies that the equipment and facilities have been designed, constructed, inspected and tested in accordance with the requirements of this specification and the Purchase Order/Contract.
INSPECTOR:	A qualified individual representing the Owner, Vendor/Contractor or the assigned Inspection Authority, who verifies that the equipment and facilities have been designed, constructed, inspected and tested in accordance with the requirements of this specification and the Purchase Order/Contract.
VENDOR:	Individual, firm or manufacturer that provide Materials/Equipment to COMPANY in accordance with this specification and terms of the Purchase Order.
AC:	Alternating current
DC:	Direct current

E_{mean} or $\bar{E}$ (lux):	Average illuminance
E_{min} (lux):	Minimum illuminance
E_{max} (lux):	Maximum illuminance
Ex:	Explosion Protection Technique
EEx d	Explosion Protection Technique - Flameproof
EEx e	Explosion Protection Technique - Increased Safety
EEx de	Explosion Protection Technique – combining Increased Safety and Flameproof approach in design
g_2	Illuminance non-uniformity
IEC:	International Electro-technical Commission
IP:	Ingress Protection
LED:	Lighting Emitting Diode
$U_o(g_1)$:	Illuminance uniformity
V:	Volts

Table 2 - Definitions and Abbreviations

3 APPLICABLE CODES AND STANDARDS

The following documents list shall constitute an integral part of this specification.

IEC - International Electro-technical Committee (latest edition shall be applied).

- IEC 60079 Electrical apparatus for explosive gas atmospheres
- IEC 60085 Electrical Insulation - Thermal evaluation and designation
- IEC 60092 Cables for offshore installations, halogen-free or mud resistant
- IEC 60146 Semiconductor converters
- IEC 60364 Low voltage electrical installations
- IEC 60445 Basic and safety principles for man-machine interface, marking and identification
- IEC 60529 Degrees of protection by enclosures
- IEC 60623 Secondary cells and batteries containing alkaline or other non-acid electrolytes vented nickel-cadmium prismatic rechargeable single cells
- IEC 60896 Stationary Lead Acid Batteries
- IEC 61892 Mobile and Fixed Offshore Units - Electrical Installations
- IEC 62259 Secondary cells and batteries containing alkaline or other non-acid electrolytes nickel-cadmium prismatic secondary single cells with partial gas recombination
- IEC TS 63116 Lighting systems - General requirements
- IEC TS 63117 General requirements for lighting systems - Safety
- IEC 60598 Luminaries
- IEC 62722 Particular requirements – LED luminaires
- IEC 61347 Lamp control gear
- BS EN 12464 Light and lighting – Lighting of work places

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4 LIGHTING REQUIREMENT

4.1 CALCULATIONS

Lighting calculations was calculated using Dialux Evo 12 lighting design program, used for professional light planning open to all manufacturers.
Calculations was carried out to determine number of fittings required to provide levels and uniformity for normal lighting and emergency lighting as defined in the COMPANY Electrical System Description & Design Philosophy K559-2254-EL-PHI-002.

4.2 ASSUMPTIONS

During normal operation both lighting systems will be in operation, providing the required illumination levels. The emergency lighting shall illuminate escape routes, emergency exits and ladders and panels. These luminaries shall have an integrated Ni-CD battery with autonomy time of 3 hours in all area and shall be ATEX classified at least Gas Group IIC (or) IIB+H2, T1 suitable for installation in zone 1 applicable in all area.

In some cases, the results of the Emin and Emin/Em will be affected by calculations made in not accessible places or where is not necessary the lighting levels, as under diagonals or behind equipment, although Dialux software consider it in their estimations.

The lighting calculations have been developed with a luminous flux in accordance with the selected lamps and luminaries.

Luminous flux for normal lighting:

Lower Deck

45W Led Linear Luminaire without ATEX protection:	6200 lm
60W Led Linear Luminaire with ATEX protection:	6200 lm

Upper Deck

45W Led Linear Luminaire with ATEX protection:	6200 lm
60W Led Linear Luminaire with ATEX protection:	6200 lm

Below Lower Deck

60W Led Linear Luminaire with ATEX protection:	6200 lm

Luminous flux for emergency lighting:

Lower Deck

60W Led Linear Luminaire with ATEX protection:	1168 lm (3 hours autonomy)

Upper Deck

60W Led Linear Luminaire with ATEX protection:	1168 lm (3 hours autonomy)

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Below Lower Deck

60W Led Linear Luminaire with ATEX protection: 1168 lm (3 hours autonomy)

Navigation lighting is considered as Navigation aids system.

4.3 ILLUMINATION LEVELS

The required illumination levels, measured at the working plane (0.8m) or 1m above the floor level in a horizontal plane, shall be as given in the table below except walkways and escape routes:

For walkways and escape routes calculation surfaces must be at the elevation 0.00m.

The illumination level indicated in the below table shall be used as a basis for the design of new installations unless higher illumination levels are required by national or local regulations in the country of installation.

The illumination levels apply when the luminaries are dirty: i.e. after taking account of the following fouling factors:

- Fouling factor of 0.80 for all plant areas and for outdoor non-plant areas;
- Fouling factor of 0.85 for indoor non-plant areas.

Location	E_{mean} (LUX)	Notes
Control Rooms		
General, including front of panel	300 - 500	See note 1
Rear of panels	50	
Auxiliary rooms	150 / 300	See note 2
Outdoor near entrances	150	
Plant Areas		
Operating areas requiring operator intervention (pumps, compressors, valves, manifolds, loading arms)	150	
Local control and monitoring points (Indicating instruments, gauges and control devices)	75	
Level gauges (see-through) to be lit from behind by single tube fluorescent luminaries		
Access ways (walk ways, platforms, stairways, ladders, module roofs)	25	
Non-operational areas with limited attendance, e.g. tank farms without equipment requiring regular operator intervention	0.5	
Non-Plant Areas		
Switchrooms, including relay and auxiliary rooms	200	

Table 3 - Required Illumination Levels

Note:

1. For control rooms, control of the illumination level should be possible either by switching off rows/groups of luminaires, or by use of electronic dimmers, or both.
    - 300 lux applies at night and 500 lux during the daytime.

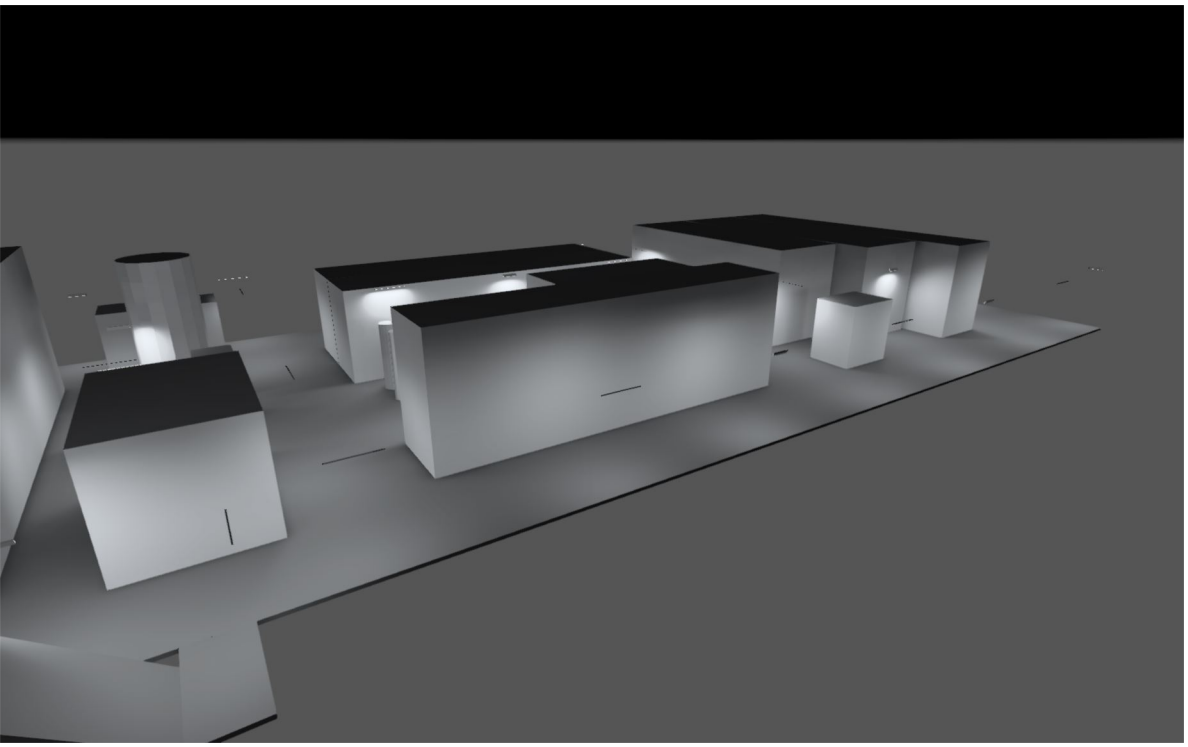
2. For auxiliary rooms, the illumination level should be controlled by switching each lamp in a twin fitting from separately controlled circuits or by switching alternative fittings.
    - 150 lux applies for normal access and 300 lux for maintenance activities

3. For Embarkation area emergency lux level should be 5lux.
4. For other areas emergency lux level should be 11lux(avg) and 1 lux(min).

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5 ANNEXES – I - LOWER DECK LIGHTING CALCULATION

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Base Load Power Hub (BLPH) - LOWER DECK LIGHTING CALCULATION

Created with DIALux

DIALux

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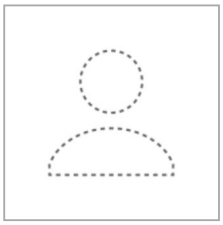
Luminaire list

Φ_{total}	P_{total}	Luminous efficacy	$\Phi_{Emergency\ lighting}$	$P_{Emergency\ lighting}$
254184 lm	2220.0 W	114.5 lm/W	29200 lm	282.5 W

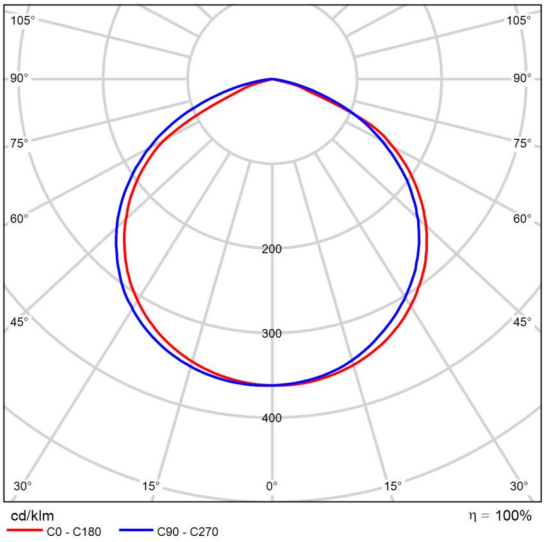
pcs.	Manufacturer	Article No.	Article name	P	Φ	Luminous efficacy
16	Cortem	LifEx-M..-0645	LifEx-M..-0645	45.0 W	6199 lm	137.8 lm/W
25	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)	60.0 W	6200 lm	103.3 lm/W
				11.3 W	1168 lm (19 %)	-

Product data sheet

Cortem - LifEx-M..-0645



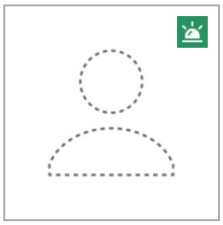
Article No.	LifEx-M..-0645
P	45.0 W
Φ_{Lamp}	6200 lm
$\Phi_{Luminaire}$	6199 lm
η	100.00 %
Luminous efficacy	137.8 lm/W
CCT	5000 K
CRI	100



Polar LDC

Product data sheet

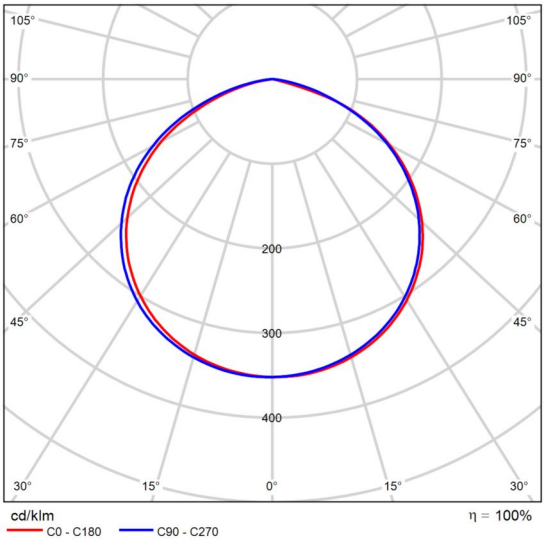
Cortem - LifEx-M..-1260 (40W)



Article No.	LifEx-M..-1260 (40W)
P	60.0 W
$P_{Emergency\ lighting}$	11.3 W
Φ_{Lamp}	6200 lm
$\Phi_{Luminaire}$	6200 lm
$\Phi_{Emergency\ lighting}$	1168 lm
η	100.00 %
Luminous efficacy	103.3 lm/W
CCT	5000 K
CRI	100
ELF	19 %

γ	C0°	C90°	C0°- C360°
0°-180°	2182.78	2182.78	2182.78
60°-90°	1013.99	988.94	1034.84

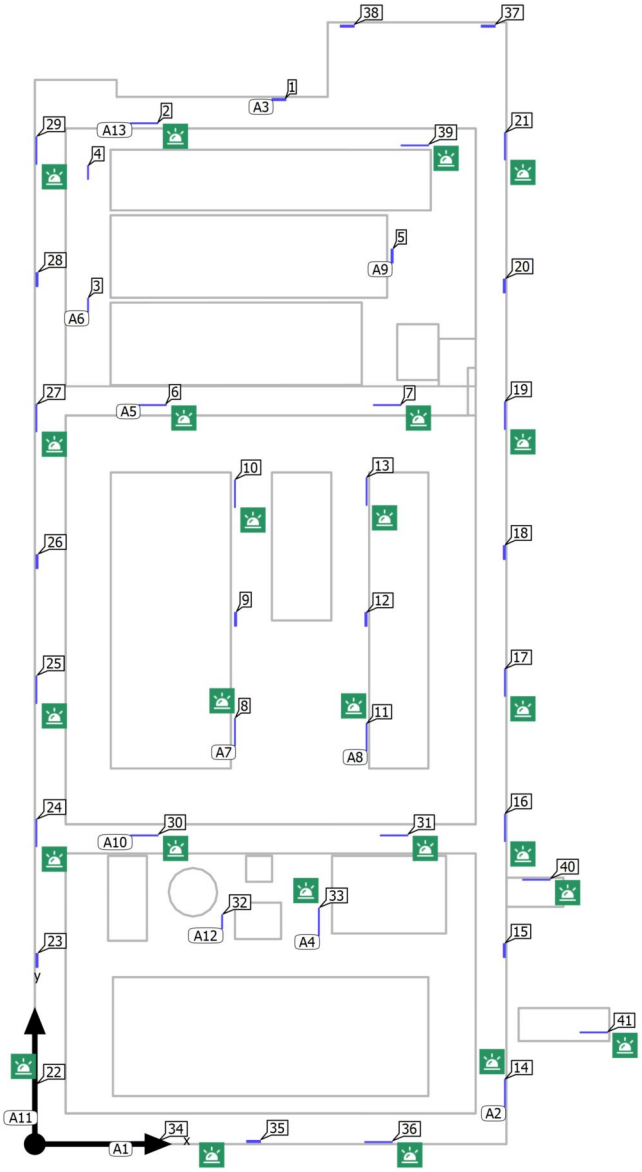
Glare valuation table [cd]



Polar LDC

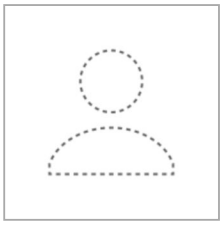
LOWER DECK

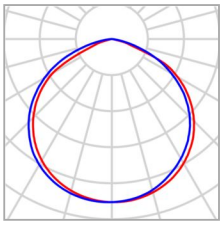
Luminaire layout plan



LOWER DECK

Luminaire layout plan





Manufacturer	Cortem	P	45.0 W
Article No.	LifEx-M..-0645	$\Phi_{Luminaire}$	6199 lm
Article name	LifEx-M..-0645		
Fitting	1x 1006B/CL307/21-35L		

3 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	9.016 m / 0.085 m / 2.700 m
X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A1

X	Y	Mounting height	Luminaire
9.016 m	0.085 m	2.700 m	35

8 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	19.378 m / 7.976 m / 2.700 m
X-direction	8 pcs., Centre - centre, Distances not equal
Arrangement	A2

X	Y	Mounting height	Luminaire
19.378 m	7.976 m	2.700 m	15
19.378 m	24.379 m	2.700 m	18
19.378 m	35.366 m	2.700 m	20

1 x Cortem LifEx-M..-0645

LOWER DECK

Luminaire layout plan

Type	Line arrangement
1st luminaire (X/Y/Z)	10.062 m / 43.072 m / 2.700 m
X-direction	1 pcs., Centre - centre, Distances not equal
Arrangement	A3

X	Y	Mounting height	Luminaire
10.062 m	43.072 m	2.700 m	1

2 x Cortem LifEx-M..-0645

Type	Line arrangement
1st luminaire (X/Y/Z)	2.193 m / 34.572 m / 3.000 m
X-direction	2 pcs., Centre - centre, Distances not equal
Arrangement	A6

X	Y	Mounting height	Luminaire
2.193 m	34.572 m	3.000 m	3
2.193 m	40.044 m	3.000 m	4

3 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	8.249 m / 21.630 m / 3.300 m
X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A7

X	Y	Mounting height	Luminaire
8.249 m	21.630 m	3.300 m	9

3 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	13.675 m / 21.625 m / 2.600 m

X	Y	Mounting height	Luminaire
13.675 m	21.625 m	2.600 m	12

LOWER DECK

Luminaire layout plan

X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A8

1 x Cortem LifEx-M..-0645

Type	Line arrangement
1st luminaire (X/Y/Z)	14.702 m / 36.598 m / 3.000 m
X-direction	1 pcs., Centre - centre, Distances not equal
Arrangement	A9

X	Y	Mounting height	Luminaire
14.702 m	36.598 m	3.000 m	5

8 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	0.064 m / 7.569 m / 2.700 m
X-direction	8 pcs., Centre - centre, Distances not equal
Arrangement	A11

X	Y	Mounting height	Luminaire
0.064 m	7.569 m	2.700 m	23
0.064 m	24.006 m	2.700 m	26
0.064 m	35.626 m	2.700 m	28

1 x Cortem LifEx-M..-0645

Type	Line arrangement
1st luminaire (X/Y/Z)	7.719 m / 9.161 m / 3.000 m
X-direction	1 pcs., Centre - centre, Distances not equal
Arrangement	A12

X	Y	Mounting height	Luminaire
7.719 m	9.161 m	3.000 m	32

LOWER DECK

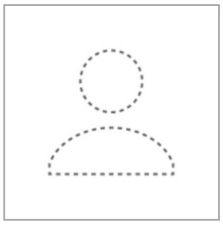
Luminaire layout plan

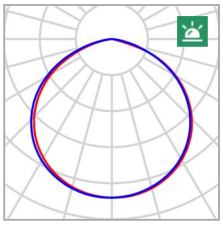
Individual luminaires

X	Y	Mounting height	Luminaire
18.687 m	46.098 m	2.700 m	37
12.877 m	46.098 m	2.700 m	38

LOWER DECK

Luminaire layout plan





Manufacturer	Cortem
Article No.	LifEx-M..-1260 (40W)
Article name	LifEx-M..-1260 (40W)
Fitting	1x LifEx-M..-1260 (40W)

P	60.0 W
$P_{Emergency\ lighting}$	11.3 W
$\Phi_{Luminaire}$	6200 lm
$\Phi_{Emergency\ lighting}$	1168 lm
ELF	19 %

3 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	4.527 m / 0.085 m / 2.700 m
X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A1

X	Y	Mounting height	Luminaire
4.527 m	0.085 m	2.700 m	34
14.167 m	0.085 m	2.700 m	36

8 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	19.378 m / 2.109 m / 2.700 m
X-direction	8 pcs., Centre - centre, Distances not equal
Arrangement	A2

X	Y	Mounting height	Luminaire
19.378 m	2.109 m	2.700 m	14
19.378 m	13.037 m	2.700 m	16
19.378 m	19.019 m	2.700 m	17
19.378 m	30.019 m	2.700 m	19
19.378 m	41.127 m	2.700 m	21

LOWER DECK

Luminaire layout plan

2 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	4.854 m / 30.458 m / 3.000 m
X-direction	2 pcs., Centre - centre, Distances not equal
Arrangement	A5

X	Y	Mounting height	Luminaire
4.854 m	30.458 m	3.000 m	6
14.524 m	30.458 m	3.000 m	7

3 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	8.249 m / 16.980 m / 3.300 m
X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A7

X	Y	Mounting height	Luminaire
8.249 m	16.980 m	3.300 m	8
8.249 m	26.800 m	3.300 m	10

3 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	13.675 m / 16.769 m / 2.600 m
X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A8

X	Y	Mounting height	Luminaire
13.675 m	16.769 m	2.600 m	11
13.675 m	26.890 m	2.600 m	13

2 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement

X	Y	Mounting height	Luminaire

LOWER DECK

Luminaire layout plan

		X	Y	Mounting height	Luminaire
1st luminaire (X/Y/Z)	14.805 m / 12.721 m / 3.000 m				
X-direction	2 pcs., Centre - centre, Distances not equal	4.514 m	12.721 m	3.000 m	30
		14.805 m	12.721 m	3.000 m	31
Arrangement	A10				

8 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement	X	Y	Mounting height	Luminaire
1st luminaire (X/Y/Z)	0.064 m / 1.914 m / 2.700 m	0.064 m	1.914 m	2.700 m	22
X-direction	8 pcs., Centre - centre, Distances not equal	0.064 m	12.824 m	2.700 m	24
		0.064 m	18.725 m	2.700 m	25
Arrangement	A11	0.064 m	29.925 m	2.700 m	27
		0.064 m	40.944 m	2.700 m	29

1 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement	X	Y	Mounting height	Luminaire
1st luminaire (X/Y/Z)	11.707 m / 9.159 m / 3.000 m	11.707 m	9.159 m	3.000 m	33
X-direction	1 pcs., Centre - centre, Distances not equal				
Arrangement	A4				

1 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement	X	Y	Mounting height	Luminaire
1st luminaire (X/Y/Z)	4.506 m / 42.071 m / 3.000 m	4.506 m	42.071 m	3.000 m	2

LOWER DECK

Luminaire layout plan

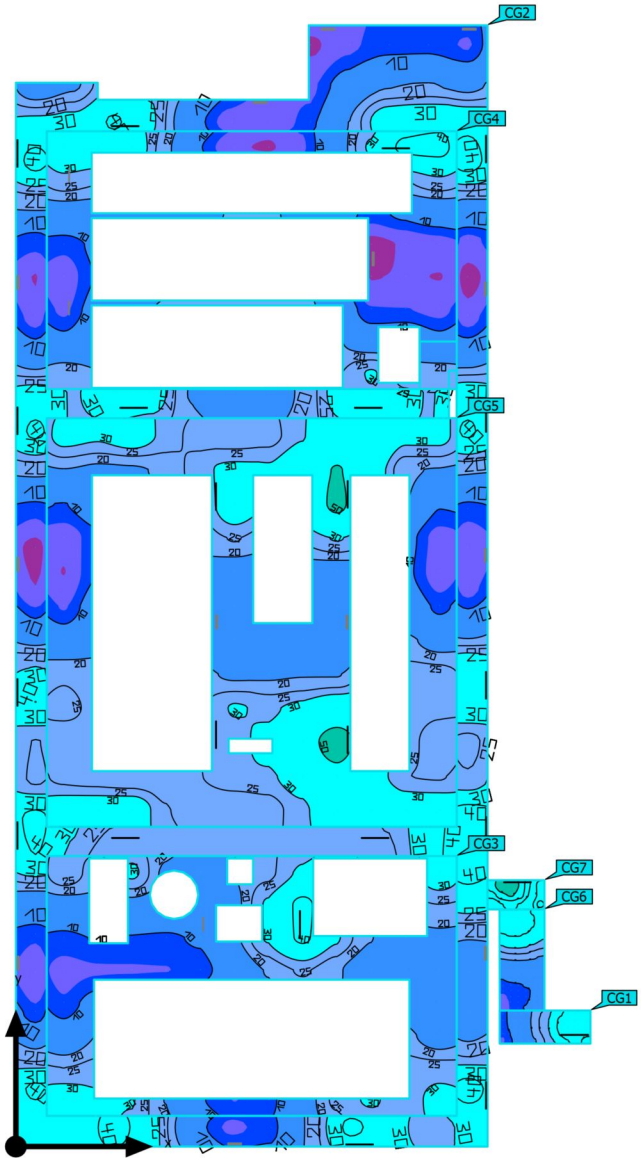
X-direction	1 pcs., Centre - centre, Distances not equal
Arrangement	A13

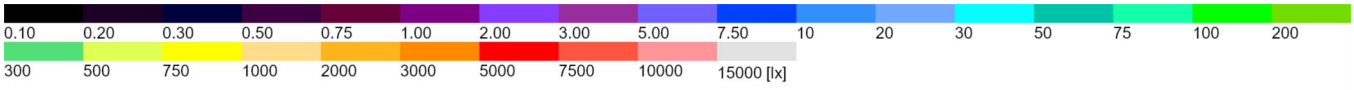
Individual luminaires

X	Y	Mounting height	Luminaire
15.663 m	41.158 m	3.000 m	39
20.673 m	10.895 m	2.700 m	40
23.038 m	4.602 m	6.200 m	41

LOWER DECK (Emergency light scene)

Calculation objects





LOWER DECK (Emergency light scene)

Calculation objects

Working planes

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
Working plane (LOWER DECK-LV SWITCH ROOM AREA) Perpendicular illuminance Height: 0.800 m, Wall zone: 0.000 m	17.5 lx	2.71 lx	63.4 lx	0.15	0.043	WP1
Working plane (STAIRWAYS(TYPICAL)) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	25.3 lx	7.51 lx	39.2 lx	0.30	0.19	WP2
Working plane (LOWER DECK-ESCAPE ROUTE) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	22.6 lx	4.21 lx	47.9 lx	0.19	0.088	WP3
Working plane (LOWER DECK-HV SWITCHROOM AREA) Perpendicular illuminance Height: 0.800 m, Wall zone: 0.000 m	19.4 lx	4.10 lx	62.7 lx	0.21	0.065	WP4
Working plane (LOWER DECK-BESS AREA) Perpendicular illuminance Height: 0.800 m, Wall zone: 0.000 m	26.4 lx	2.95 lx	94.5 lx	0.11	0.031	WP5
Working plane (STAIRWAYS(TYPICAL)) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	45.5 lx	37.0 lx	51.7 lx	0.81	0.72	WP6

Calculation surfaces

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
STAIRWAYS Horizontal illuminance Height: 0.000 m	25.3 lx	7.22 lx	39.6 lx	0.29	0.18	CG1
LOWER DECK-ESCAPE ROUTE Horizontal illuminance Height: 0.000 m	22.5 lx	4.23 lx	48.0 lx	0.19	0.088	CG2
HV SWITCHROOM AREA Horizontal illuminance Height: 0.000 m	19.9 lx	6.66 lx	41.6 lx	0.33	0.16	CG3

LOWER DECK (Emergency light scene)

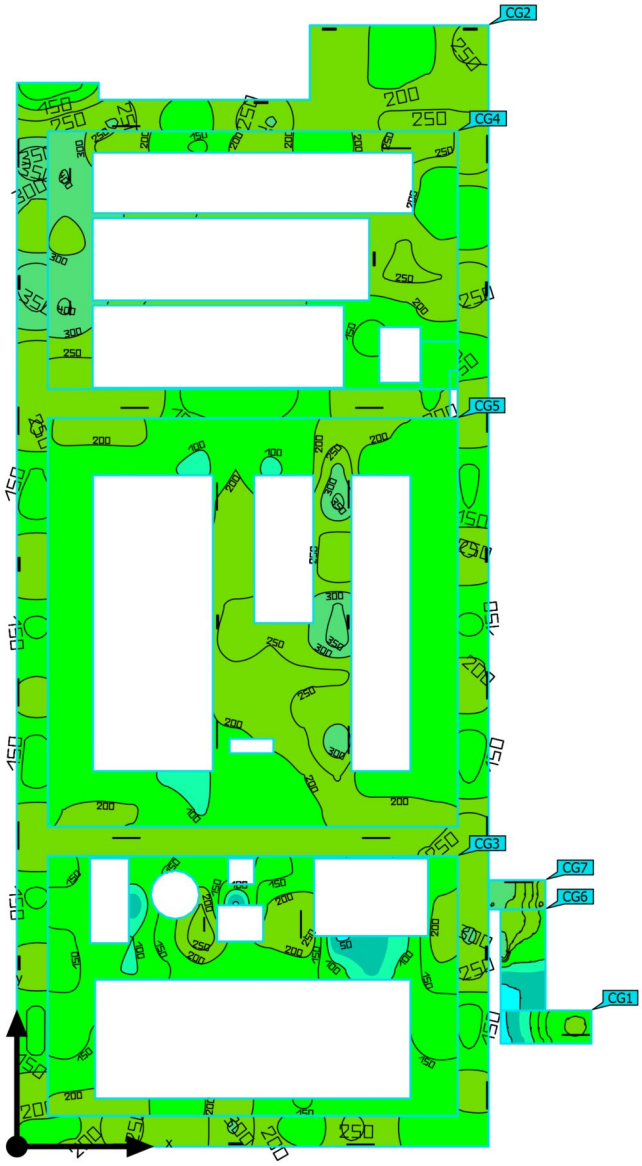
Calculation objects

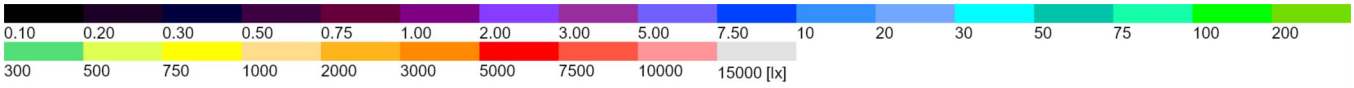
LV SWITCHROOM AREA Horizontal illuminance Height: 0.000 m	16.5 lx	4.25 lx	42.0 lx	0.26	0.10	CG4
BESSAREA Horizontal illuminance Height: 0.000 m	25.7 lx	4.95 lx	56.7 lx	0.19	0.087	CG5
STAIRWAYS STEPS Perpendicular illuminance Height: 1.754 m	23.4 lx	6.54 lx	46.7 lx	0.28	0.14	CG6
STAIRWAYS STEPS Horizontal illuminance Height: 1.754 m	19.8 lx	7.57 lx	42.7 lx	0.38	0.18	CG6
STAIRWAYS Horizontal illuminance Height: -0.000 m	45.5 lx	36.8 lx	51.9 lx	0.81	0.71	CG7

Notes on planning:
The emergency lighting scene was calculated without reflection and without taking into account the placed furniture.

LOWER DECK (Normal Lighting)

Calculation objects





LOWER DECK (Normal Lighting)

Calculation objects

Working planes

Properties	Ē (Target)	E_{min}	E_{max}	U_o (g_1) (Target)	g_2	Index
Working plane (LOWER DECK-LV SWITCH ROOM AREA) Perpendicular illuminance Height: 0.800 m, Wall zone: 0.000 m	273 lx (≥ 150 lx)	100 lx	602 lx	0.37 (≥ 0.25)	0.17	WP1
Working plane (STAIRWAYS(TYPICAL)) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	134 lx (≥ 100 lx)	39.9 lx	208 lx	0.30 (≥ 0.25)	0.19	WP2
Working plane (LOWER DECK-ESCAPE ROUTE) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	213 lx (≥ 150 lx)	88.0 lx	391 lx	0.41 (≥ 0.25)	0.23	WP3
Working plane (LOWER DECK-HV SWITCHROOM AREA) Perpendicular illuminance Height: 0.800 m, Wall zone: 0.000 m	175 lx (≥ 150 lx)	51.2 lx	433 lx	0.29 (≥ 0.25)	0.12	WP4
Working plane (LOWER DECK-BESS AREA) Perpendicular illuminance Height: 0.800 m, Wall zone: 0.000 m	200 lx (≥ 150 lx)	58.8 lx	572 lx	0.29 (≥ 0.25)	0.10	WP5
Working plane (STAIRWAYS(TYPICAL)) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	276 lx (≥ 100 lx)	212 lx	309 lx	0.77 (≥ 0.25)	0.69	WP6

Calculation surfaces

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
STAIRWAYS Horizontal illuminance Height: 0.000 m	135 lx	38.5 lx	210 lx	0.29	0.18	CG1
LOWER DECK-ESCAPE ROUTE Horizontal illuminance Height: 0.000 m	214 lx	104 lx	392 lx	0.49	0.27	CG2
HV SWITCHROOM AREA Horizontal illuminance Height: 0.000 m	160 lx	46.3 lx	279 lx	0.29	0.17	CG3

LOWER DECK (Normal Lighting)

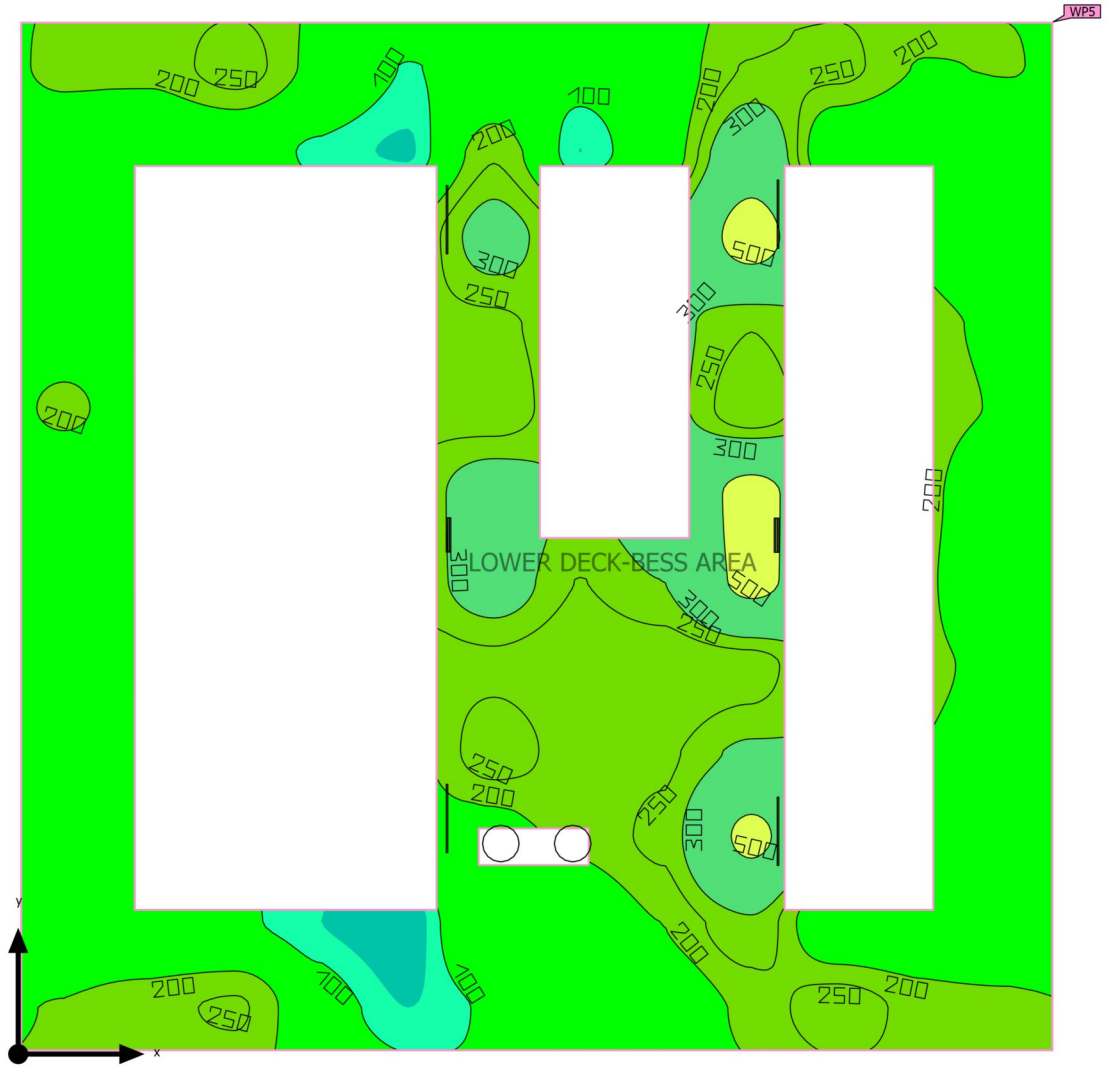
Calculation objects

LV SWITCHROOM AREA Horizontal illuminance Height: 0.000 m	235 lx	120 lx	409 lx	0.51	0.29	CG4
BESSAREA Horizontal illuminance Height: 0.000 m	188 lx	77.4 lx	368 lx	0.41	0.21	CG5
STAIRWAYS STEPS Perpendicular illuminance Height: 1.754 m	143 lx	37.8 lx	361 lx	0.26	0.10	CG6
STAIRWAYS STEPS Horizontal illuminance Height: 1.754 m	136 lx	41.5 lx	395 lx	0.31	0.11	CG6
STAIRWAYS Horizontal illuminance Height: -0.000 m	277 lx	208 lx	311 lx	0.75	0.67	CG7

Utilisation profile: Offshore gas and oil structures (5.8.7 Pipe rack area/deck)

LOWER DECK · LOWER DECK-BESS AREA (Normal Lighting)

Summary





Ground area	179.64 m²
Maintenance factor	0.80 (fixed)

Mounting height	2.600 m – 3.300 m
Height Working plane	0.800 m
Wall zone Working plane	0.000 m

LOWER DECK · LOWER DECK-BESS AREA (Normal Lighting)

Summary

Results

	Symbol	Calculated	Target	Index
Working plane	$\bar{E}_{perpendicular}$	200 lx	≥ 150 lx	WP5
	U_o (g_1)	0.29	≥ 0.25	WP5
	Lighting power density	1.85 W/m²	–	
		0.92 W/m²/100 lx	–	
Energy estimation(2)	Consumption	1156 kWh/a	max. 6300 kWh/a	
Space	Lighting power density	1.84 W/m²	–	
		0.92 W/m²/100 lx	–	

(1) Based on a rectangular space of 16.900 m x 16.850 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

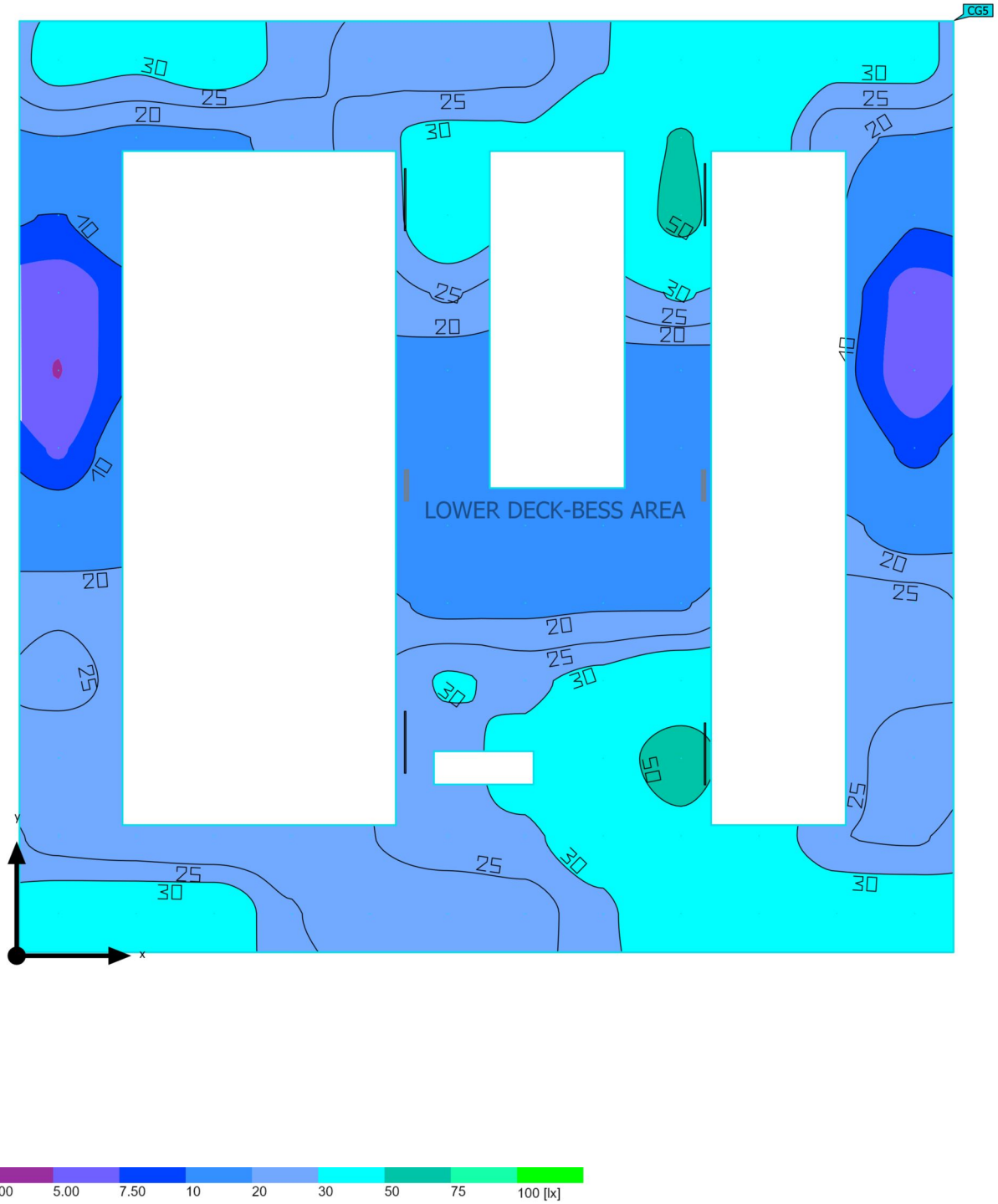
Utilisation profile: Offshore gas and oil structures (5.8.7 Pipe rack area/deck)

Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
2	Cortem	LifEx-M..-0645	LifEx-M..-0645	–	45.0 W	6199 lm	137.8 lm/W
4	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)	–	60.0 W	6200 lm	103.3 lm/W
				–	11.3 W	1168 lm (19 %)	-

LOWER DECK-BESS AREA (Emergency light scene)

Calculation objects



LOWER DECK-BESS AREA (Emergency light scene)

Calculation objects

Working planes

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
Working plane (LOWER DECK-BESS AREA) Perpendicular illuminance Height: 0.800 m, Wall zone: 0.000 m	26.4 lx	2.95 lx	94.5 lx	0.11	0.031	WP5

Calculation surfaces

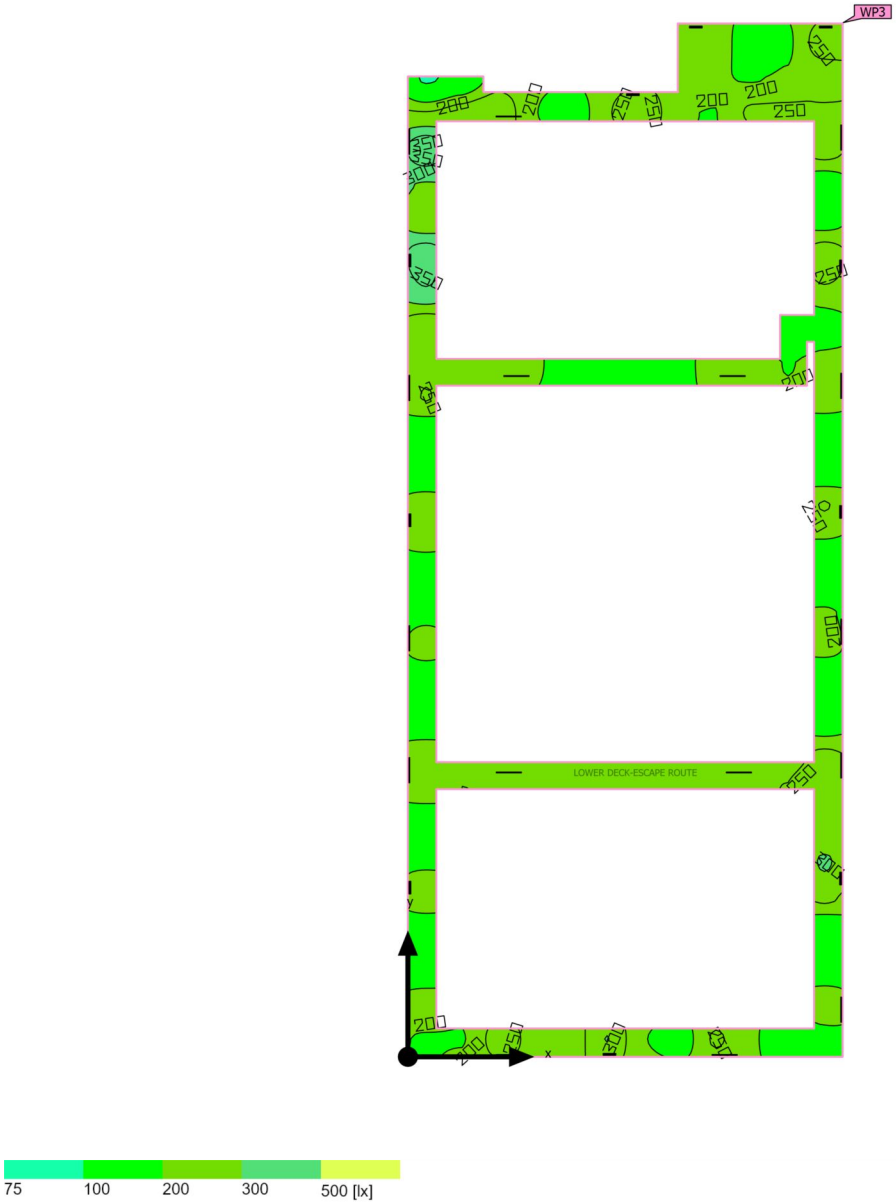
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
BESSAREA Horizontal illuminance Height: 0.000 m	25.7 lx	4.95 lx	56.7 lx	0.19	0.087	CG5

(1) Based on a rectangular space of 16.900 m x 16.850 m and SHR of 0.25.

Notes on planning:
The emergency lighting scene was calculated without reflection and without taking into account the placed furniture.

LOWER DECK · LOWER DECK-ESCAPE ROUTE (Normal Lighting)

Summary



Ground area	220.88 m²
Maintenance factor	0.80 (fixed)

Mounting height	2.700 m – 3.000 m
Height Working plane	0.000 m
Wall zone Working plane	0.000 m

LOWER DECK · LOWER DECK-ESCAPE ROUTE (Normal Lighting)

Summary

Results

	Symbol	Calculated	Target	Index
Working plane	$\bar{E}_{perpendicular}$	213 lx	≥ 150 lx	WP3
	U_o (g_1)	0.41	≥ 0.25	WP3
Energy estimation(2)	Consumption	5151 kWh/a	max. 7750 kWh/a	
Space	Lighting power density	6.66 W/m²	–	
		3.13 W/m²/100 lx	–	

(1) Based on a rectangular space of 46.229 m x 19.440 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

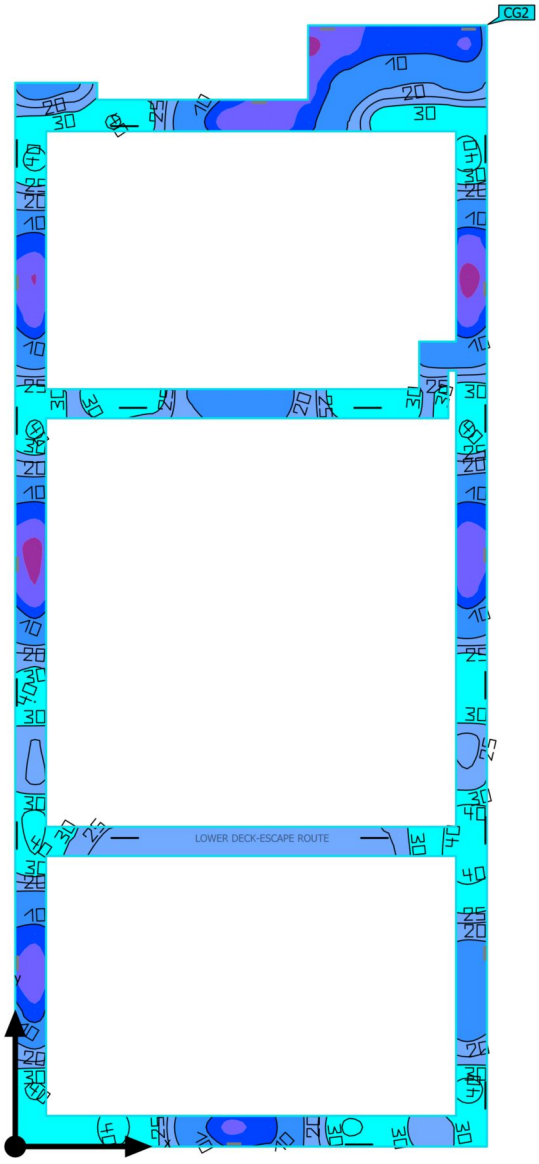
Utilisation profile: Offshore gas and oil structures (5.8.7 Pipe rack area/deck)

Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
10	Cortem	LifEx-M..-0645	LifEx-M..-0645	–	45.0 W	6199 lm	137.8 lm/W
17	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)	–	60.0 W	6200 lm	103.3 lm/W
				–	11.3 W	1168 lm (19 %)	-

LOWER DECK-ESCAPE ROUTE (Emergency light scene)

Calculation objects





LOWER DECK-ESCAPE ROUTE (Emergency light scene)

Calculation objects

Working planes

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
Working plane (LOWER DECK-ESCAPE ROUTE) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	22.6 lx	4.21 lx	47.9 lx	0.19	0.088	WP3

Calculation surfaces

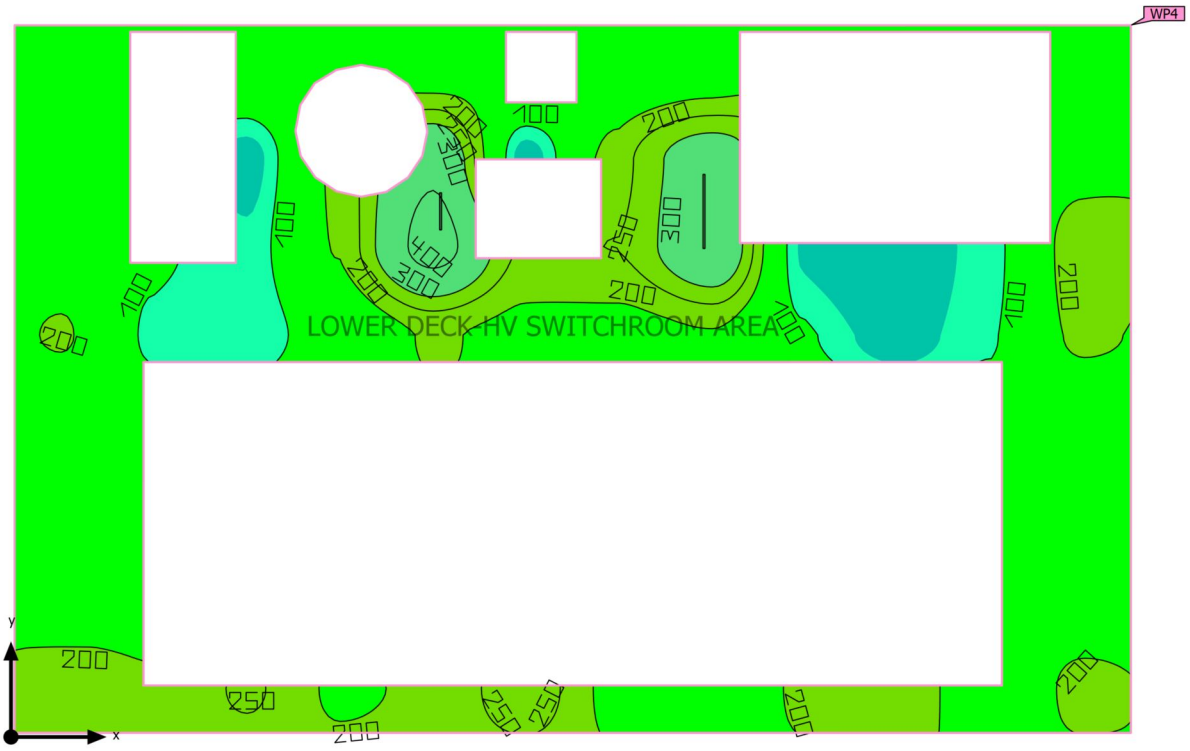
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
LOWER DECK-ESCAPE ROUTE Horizontal illuminance Height: 0.000 m	22.5 lx	4.23 lx	48.0 lx	0.19	0.088	CG2

(1) Based on a rectangular space of 46.229 m x 19.440 m and SHR of 0.25.

Notes on planning:
The emergency lighting scene was calculated without reflection and without taking into account the placed furniture.

LOWER DECK-HV SWITCHROOM AREA (Normal Lighting)

Summary





Ground area	89.68 m²
Maintenance factor	0.80 (fixed)

Mounting height	3.000 m
Height Working plane	0.800 m
Wall zone Working plane	0.000 m

LOWER DECK-HV SWITCHROOM AREA (Normal Lighting)

Summary

Results

	Symbol	Calculated	Target	Index
Working plane	$\bar{E}_{perpendicular}$	175 lx	≥ 150 lx	WP4
	U_o (g_1)	0.29	≥ 0.25	WP4
Energy estimation(2)	Consumption	368 kWh/a	max. 3150 kWh/a	
Space	Lighting power density	1.17 W/m²	–	
		0.67 W/m²/100 lx	–	

(1) Based on a rectangular space of 16.900 m x 10.714 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

Utilisation profile: Offshore gas and oil structures (5.8.7 Pipe rack area/deck)

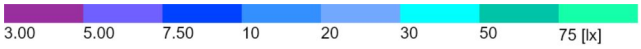
Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
1	Cortem	LifEx-M..-0645	LifEx-M..-0645	–	45.0 W	6199 lm	137.8 lm/W
1	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)	–	60.0 W	6200 lm	103.3 lm/W
				–	11.3 W	1168 lm (19 %)	-

LOWER DECK-HV SWITCHROOM AREA (Emergency light scene)

Calculation objects





LOWER DECK-HV SWITCHROOM AREA (Emergency light scene)

Calculation objects

Working planes

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
Working plane (LOWER DECK-HV SWITCHROOM AREA) Perpendicular illuminance Height: 0.800 m, Wall zone: 0.000 m	19.4 lx	4.10 lx	62.7 lx	0.21	0.065	WP4

Calculation surfaces

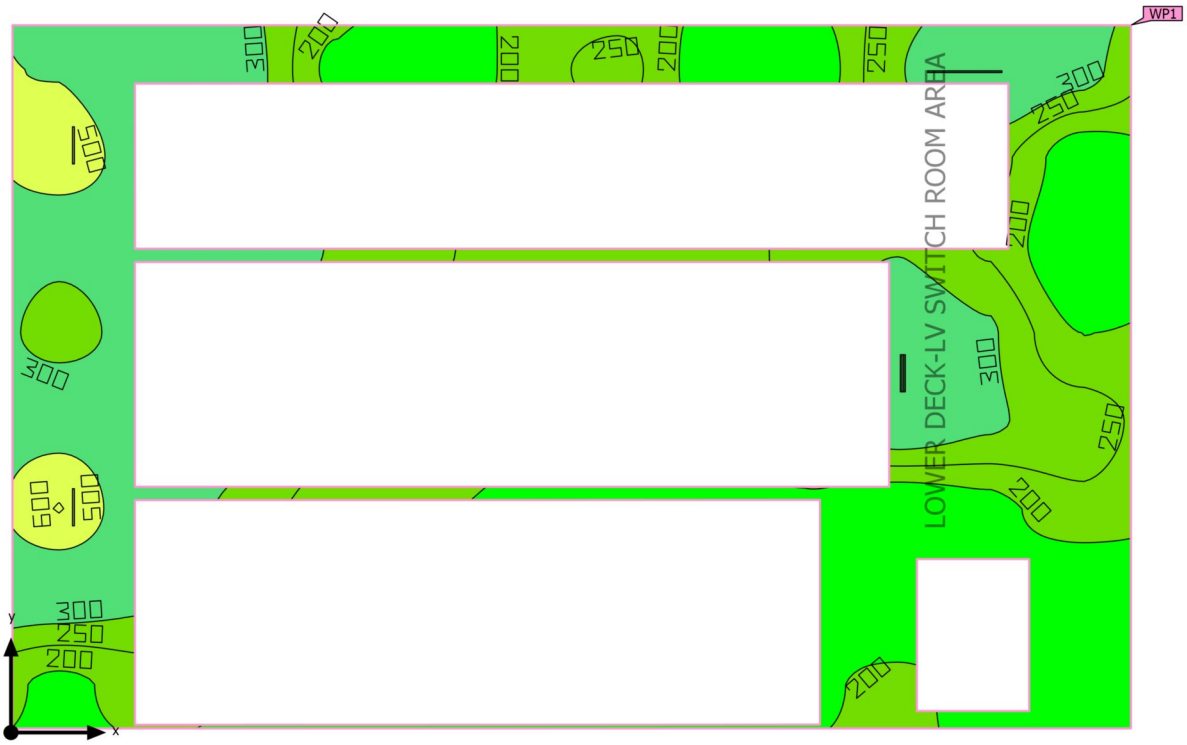
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
HV SWITCHROOM AREA Horizontal illuminance Height: 0.000 m	19.9 lx	6.66 lx	41.6 lx	0.33	0.16	CG3

(1) Based on a rectangular space of 16.900 m x 10.714 m and SHR of 0.25.

Notes on planning:
The emergency lighting scene was calculated without reflection and without taking into account the placed furniture.

LOWER DECK · LOWER DECK-LV SWITCH ROOM AREA (Normal Lighting)

Summary





Ground area	68.77 m²
Maintenance factor	0.80 (fixed)

Mounting height	3.000 m
Height Working plane	0.800 m
Wall zone Working plane	0.000 m

LOWER DECK · LOWER DECK-LV SWITCH ROOM AREA (Normal Lighting)

Summary

Results

	Symbol	Calculated	Target	Index
Working plane	$\bar{E}_{perpendicular}$	273 lx	≥ 150 lx	WP1
	U_o (g_1)	0.37	≥ 0.25	WP1
Energy estimation(2)	Consumption	683 kWh/a	max. 2450 kWh/a	
Space	Lighting power density	2.84 W/m²	–	
		1.04 W/m²/100 lx	–	

(1) Based on a rectangular space of 16.901 m x 10.630 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

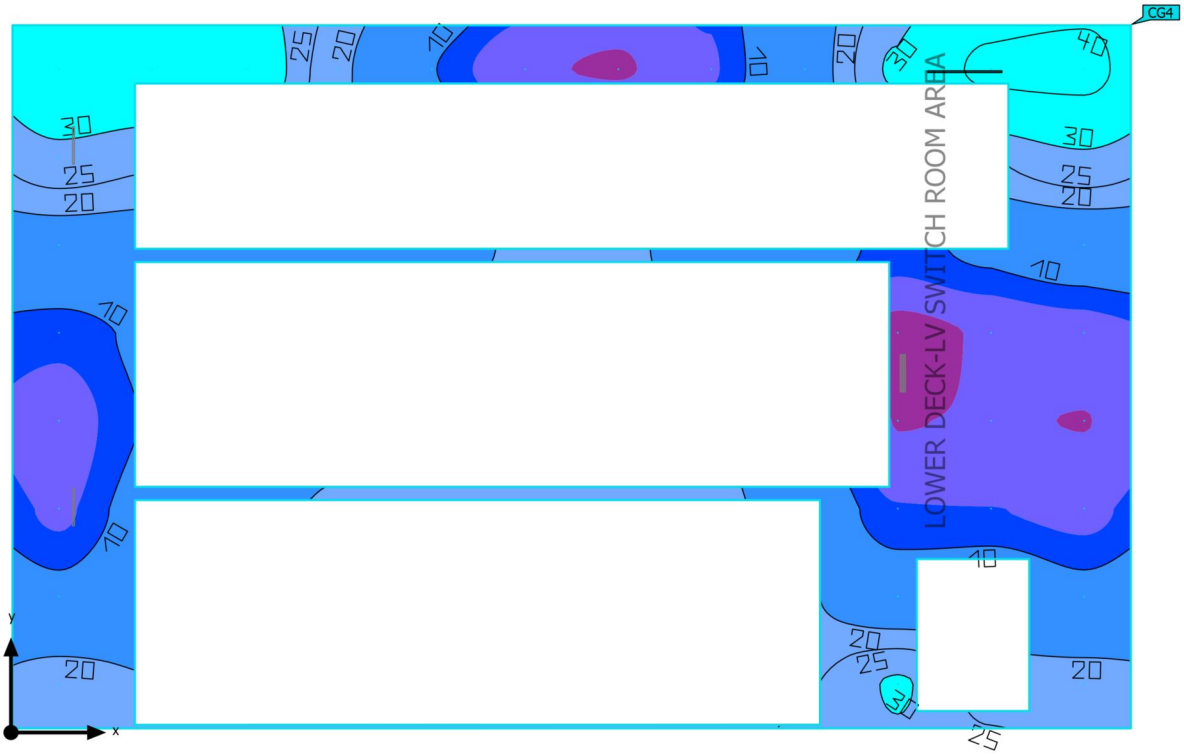
Utilisation profile: Offshore gas and oil structures (5.8.7 Pipe rack area/deck)

Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
3	Cortem	LifEx-M..-0645	LifEx-M..-0645	–	45.0 W	6199 lm	137.8 lm/W
1	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)	–	60.0 W	6200 lm	103.3 lm/W
				–	11.3 W	1168 lm (19 %)	-

LOWER DECK-LV SWITCH ROOM AREA (Emergency light scene)

Calculation objects





LOWER DECK-LV SWITCH ROOM AREA (Emergency light scene)

Calculation objects

Working planes

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
Working plane (LOWER DECK-LV SWITCH ROOM AREA) Perpendicular illuminance Height: 0.800 m, Wall zone: 0.000 m	17.5 lx	2.71 lx	63.4 lx	0.15	0.043	WP1

Calculation surfaces

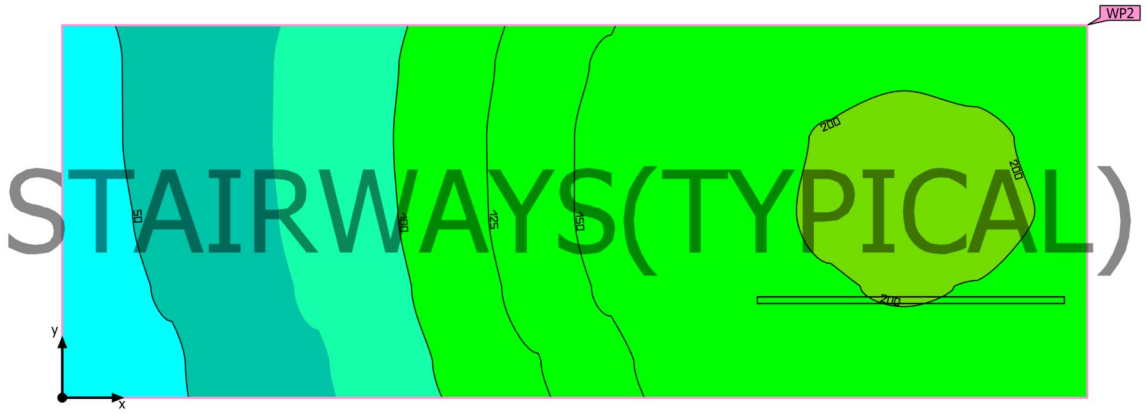
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
LV SWITCHROOM AREA Horizontal illuminance Height: 0.000 m	16.5 lx	4.25 lx	42.0 lx	0.26	0.10	CG4

(1) Based on a rectangular space of 16.901 m x 10.630 m and SHR of 0.25.

Notes on planning:
The emergency lighting scene was calculated without reflection and without taking into account the placed furniture.

STAIRWAYS(TYPICAL) (Normal Lighting)

Summary





Ground area	5.08 m²
Maintenance factor	0.80 (fixed)

Mounting height	2.700 m
Height Working plane	0.000 m
Wall zone Working plane	0.000 m

STAIRWAYS(TYPICAL) (Normal Lighting)

Summary

Results

	Symbol	Calculated	Target	Index
Working plane	$\bar{E}_{perpendicular}$	134 lx	≥ 100 lx	WP2
	U_o (g_1)	0.30	≥ 0.25	WP2
Energy estimation(2)	Consumption	526 kWh/a	max. 200 kWh/a	
Space	Lighting power density	11.80 W/m²	–	
		8.78 W/m²/100 lx	–	

(1) Based on a rectangular space of 3.738 m x 1.360 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

Utilisation profile: Offshore gas and oil structures (5.8.2 Ladders, stairs, walkways)

Luminaire list

pcs.	Manufacturer	Article No.	Article name		R_{UG}	P	Φ	Luminous efficacy
1	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)		–	60.0 W	6200 lm	103.3 lm/W
					–	11.3 W	1168 lm (19 %)	-

STAIRWAYS(TYPICAL) (Emergency light scene)

Calculation objects





STAIRWAYS(TYPICAL) (Emergency light scene)

Calculation objects

Working planes

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
Working plane (STAIRWAYS(TYPICAL)) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	25.3 lx	7.51 lx	39.2 lx	0.30	0.19	WP2

Calculation surfaces

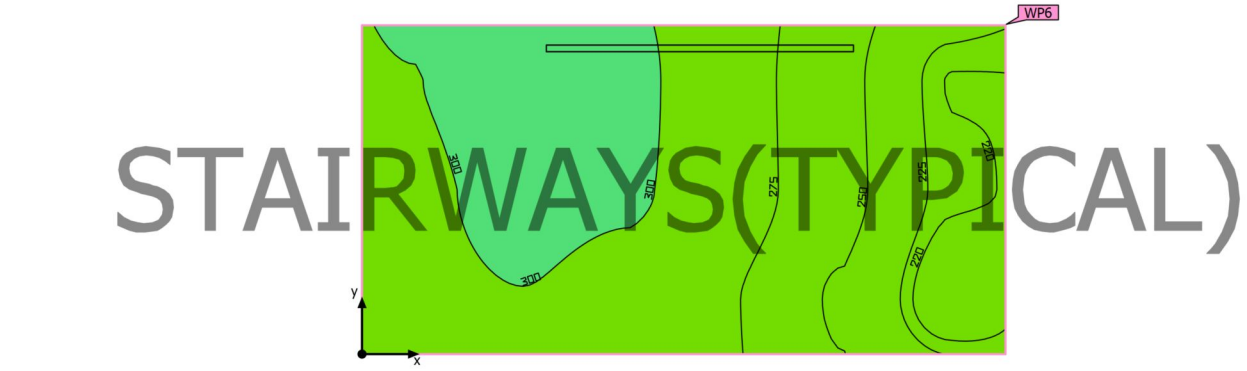
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
STAIRWAYS Horizontal illuminance Height: 0.000 m	25.3 lx	7.22 lx	39.6 lx	0.29	0.18	CG1

(1) Based on a rectangular space of 3.738 m x 1.360 m and SHR of 0.25.

Notes on planning:
The emergency lighting scene was calculated without reflection and without taking into account the placed furniture.

STAIRWAYS(TYPICAL) (Normal Lighting)

Summary





Ground area	2.82 m²
Maintenance factor	0.80 (fixed)

Mounting height	2.700 m
Height Working plane	0.000 m
Wall zone Working plane	0.000 m

STAIRWAYS(TYPICAL) (Normal Lighting)

Summary

Results

	Symbol	Calculated	Target	Index
Working plane	$\bar{E}_{perpendicular}$	276 lx	≥ 100 lx	WP6
	U_o (g_1)	0.77	≥ 0.25	WP6
Energy estimation(2)	Consumption	526 kWh/a	max. 100 kWh/a	
Space	Lighting power density	21.31 W/m²	–	
		7.71 W/m²/100 lx	–	

(1) Based on a rectangular space of 2.347 m x 1.200 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

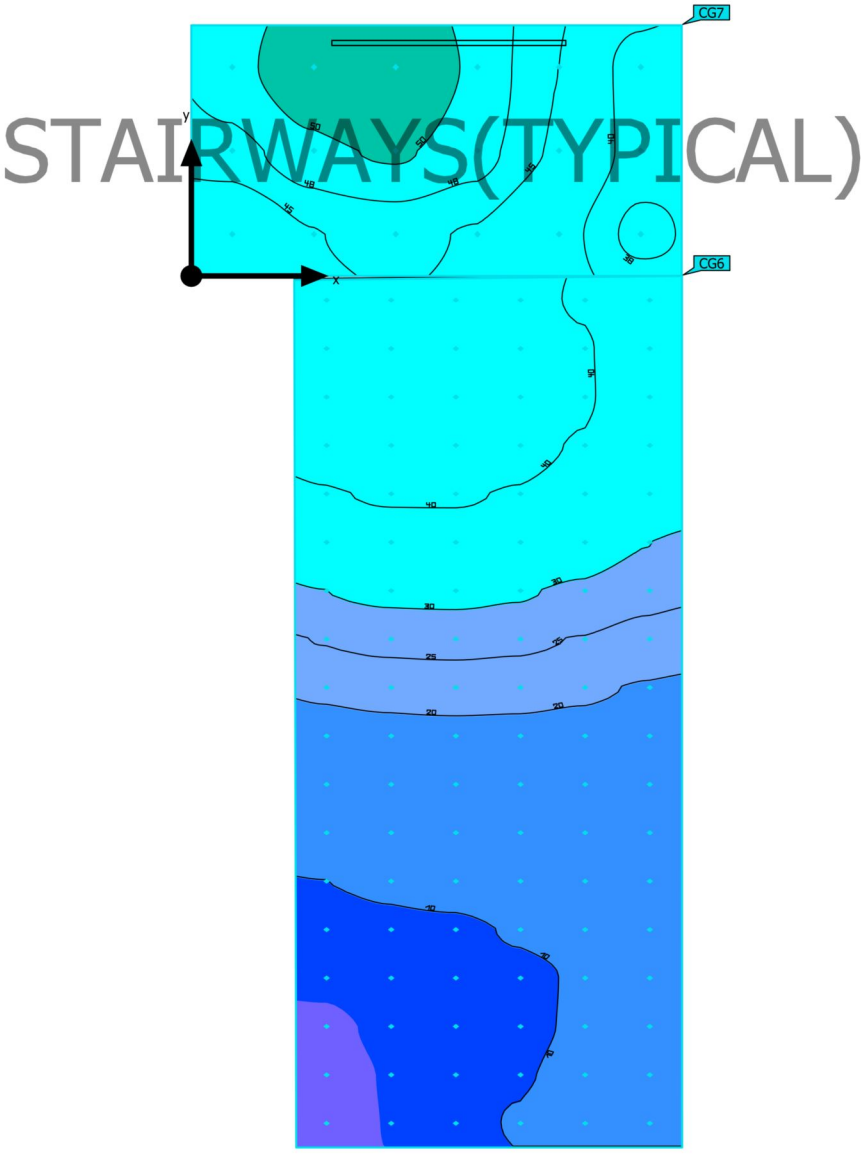
Utilisation profile: Offshore gas and oil structures (5.8.2 Ladders, stairs, walkways)

Luminaire list

pcs.	Manufacturer	Article No.	Article name		R_{UG}	P	Φ	Luminous efficacy
1	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)		–	60.0 W	6200 lm	103.3 lm/W
					–	11.3 W	1168 lm (19 %)	-

STAIRWAYS(TYPICAL) (Emergency light scene)

Calculation objects



30 50 75 [lx]

STAIRWAYS(TYPICAL) (Emergency light scene)

Calculation objects

Working planes

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
Working plane (STAIRWAYS(TYPICAL)) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	45.5 lx	37.0 lx	51.7 lx	0.81	0.72	WP6

Calculation surfaces

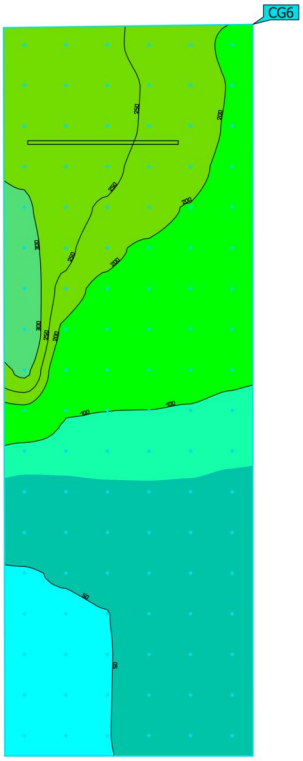
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
STAIRWAYS STEPS Perpendicular illuminance Height: 1.754 m	23.4 lx	6.54 lx	46.7 lx	0.28	0.14	CG6
STAIRWAYS STEPS Horizontal illuminance Height: 1.754 m	19.8 lx	7.57 lx	42.7 lx	0.38	0.18	CG6
STAIRWAYS Horizontal illuminance Height: -0.000 m	45.5 lx	36.8 lx	51.9 lx	0.81	0.71	CG7

(1) Based on a rectangular space of 2.347 m x 1.200 m and SHR of 0.25.

Notes on planning:
The emergency lighting scene was calculated without reflection and without taking into account the placed furniture.

STAIRWAYS(TYPICAL) (Normal Lighting)

STAIRWAYS STEPS



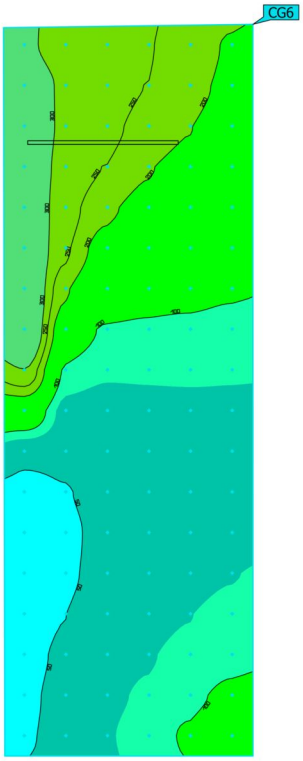


Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
STAIRWAYS STEPS Perpendicular illuminance Height: 1.754 m	143 lx	37.8 lx	361 lx	0.26	0.10	CG6

Utilisation profile: Offshore gas and oil structures (5.8.2 Ladders, stairs, walkways)

STAIRWAYS(TYPICAL) (Normal Lighting)

STAIRWAYS STEPS





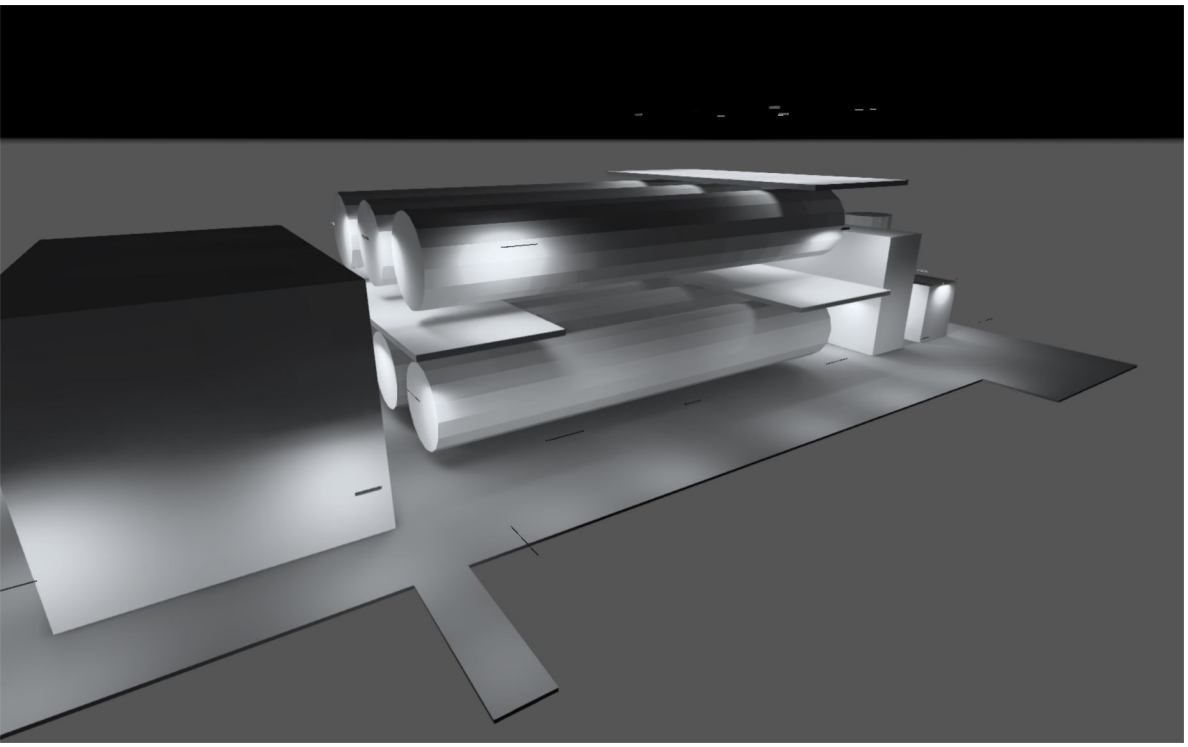
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
STAIRWAYS STEPS Horizontal illuminance Height: 1.754 m	136 lx	41.5 lx	395 lx	0.31	0.11	CG6

Utilisation profile: Offshore gas and oil structures (5.8.2 Ladders, stairs, walkways)

6 ANNEXES – II - UPPER DECK LIGHTING CALCULATION

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DIALux



Base Load Power Hub (BLPH) - UPPER DECK LIGHTING CALCULATION

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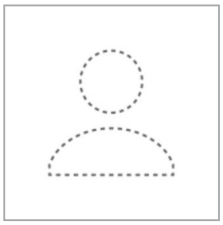
Luminaire list

Φ_{total}	P_{total}	Luminous efficacy	$\Phi_{Emergency\ lighting}$	$P_{Emergency\ lighting}$
309975 lm	2625.0 W	118.1 lm/W	29200 lm	282.5 W

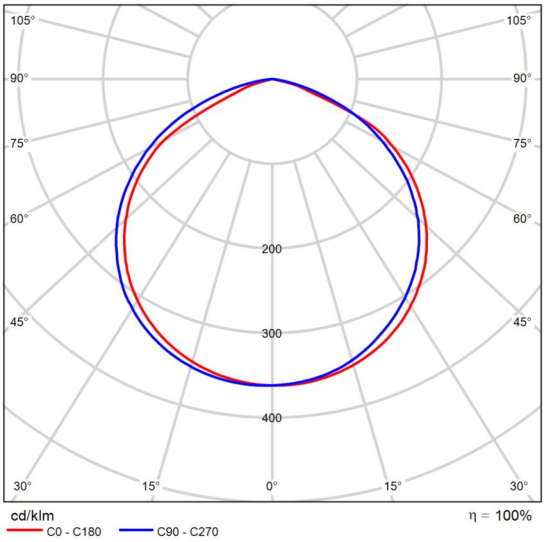
pcs.	Manufacturer	Article No.	Article name	P	Φ	Luminous efficacy
25	Cortem	LifEx-M..-0645	LifEx-M..-0645	45.0 W	6199 lm	137.8 lm/W
25	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)	60.0 W	6200 lm	103.3 lm/W
				11.3 W	1168 lm (19 %)	-

Product data sheet

Cortem - LifEx-M..-0645



Article No.	LifEx-M..-0645
P	45.0 W
Φ_{Lamp}	6200 lm
$\Phi_{Luminaire}$	6199 lm
η	100.00 %
Luminous efficacy	137.8 lm/W
CCT	5000 K
CRI	100

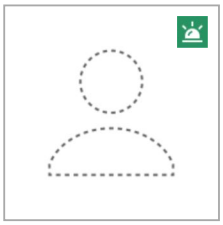


Polar LDC

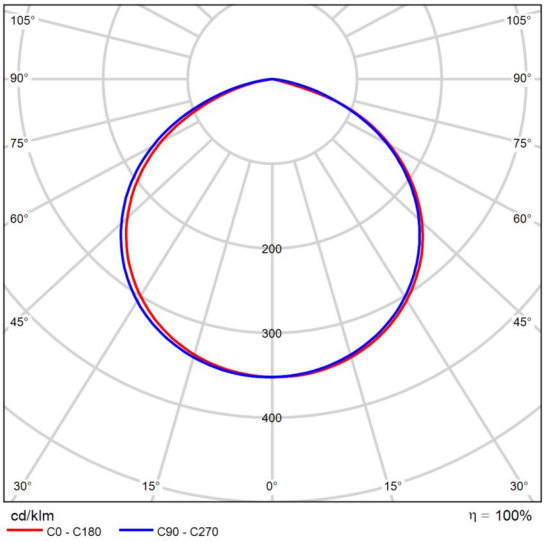
DIALux

Product data sheet

Cortem - LifEx-M..-1260 (40W)



Article No.	LifEx-M..-1260 (40W)
P	60.0 W
$P_{Emergency\ lighting}$	11.3 W
Φ_{Lamp}	6200 lm
$\Phi_{Luminaire}$	6200 lm
$\Phi_{Emergency\ lighting}$	1168 lm
η	100.00 %
Luminous efficacy	103.3 lm/W
CCT	5000 K
CRI	100
ELF	19 %



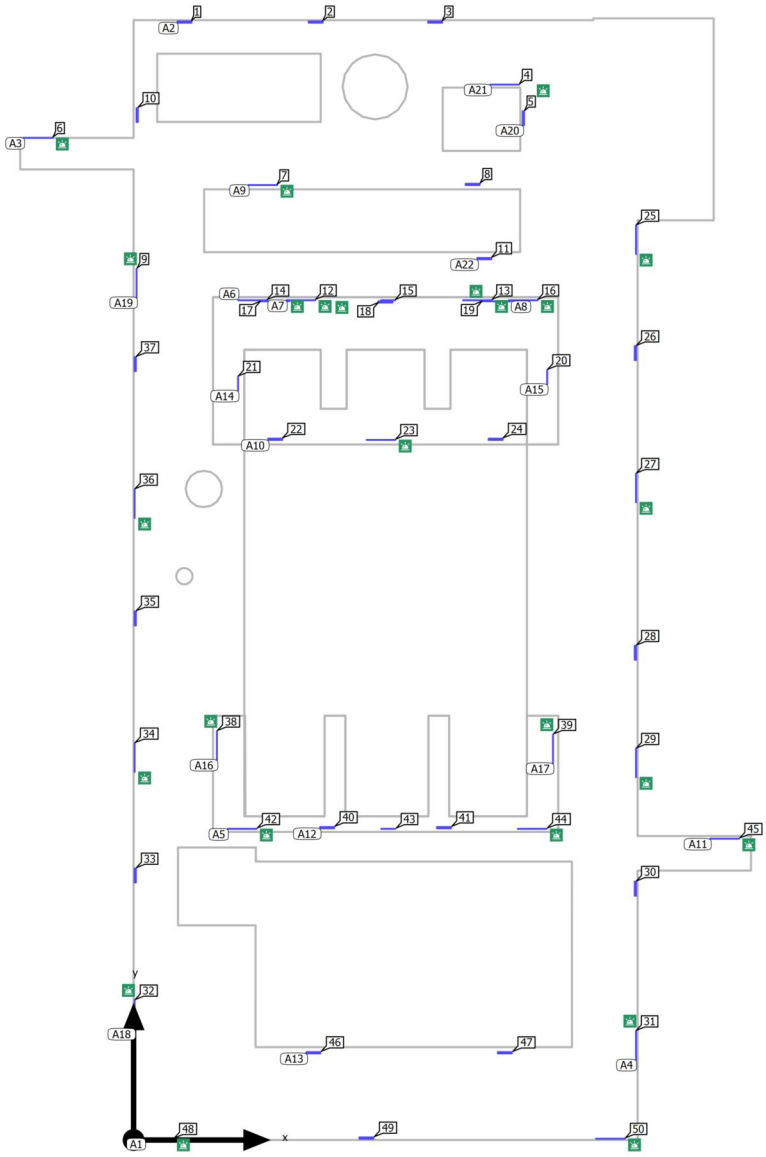
Polar LDC

γ	C0°	C90°	C0°- C360°
0°-180°	2182.78	2182.78	2182.78
60°-90°	1013.99	988.94	1034.84

Glare valuation table [cd]

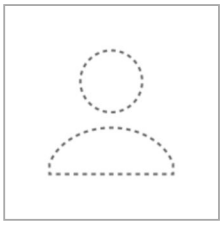
UPPER DECK

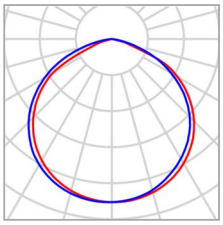
Luminaire layout plan



UPPER DECK

Luminaire layout plan





Manufacturer	Cortem	P	45.0 W
Article No.	LifEx-M..-0645	$\Phi_{Luminaire}$	6199 lm
Article name	LifEx-M..-0645		
Fitting	1x 1006B/CL307/21-35L		

3 x Cortem LifEx-M..-0645

Type	Line arrangement
1st luminaire (X/Y/Z)	1.962 m / 43.093 m / 2.700 m
X-direction	4 pcs., Centre - centre, Distances not equal
Arrangement	A2

X	Y	Mounting height	Luminaire
1.962 m	43.093 m	2.700 m	1
7.018 m	43.093 m	2.700 m	2
11.618 m	43.093 m	2.700 m	3

7 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	19.359 m / 30.314 m / 2.700 m
X-direction	7 pcs., Centre - centre, Distances not equal
Arrangement	A4

X	Y	Mounting height	Luminaire
19.359 m	30.314 m	2.700 m	26
19.359 m	18.771 m	2.700 m	28
19.359 m	9.681 m	2.700 m	30

3 x Cortem LifEx-M..-1260 (40W)

UPPER DECK

Luminaire layout plan

Type	Line arrangement
1st luminaire (X/Y/Z)	9.705 m / 32.311 m / 10.870 m
X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A8

X	Y	Mounting height	Luminaire
9.705 m	32.311 m	10.870 m	18

2 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	13.062 m / 36.788 m / 3.000 m
X-direction	2 pcs., Centre - centre, Distances not equal
Arrangement	A9

X	Y	Mounting height	Luminaire
13.062 m	36.788 m	3.000 m	8

3 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	9.805 m / 32.350 m / 6.470 m
X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A6

X	Y	Mounting height	Luminaire
9.805 m	32.350 m	6.470 m	15

3 x Cortem LifEx-M..-0645

Type	Line arrangement
1st luminaire (X/Y/Z)	5.455 m / 26.970 m / 10.870 m

X	Y	Mounting height	Luminaire
5.455 m	26.970 m	10.870 m	22
13.950 m	26.970 m	10.870 m	24

UPPER DECK

Luminaire layout plan

X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A10

2 x Cortem LifEx-M..-0645

Type	Line arrangement
1st luminaire (X/Y/Z)	6.926 m / 3.387 m / 2.700 m
X-direction	2 pcs., Centre - centre, Distances not equal
Arrangement	A13

X	Y	Mounting height	Luminaire
6.926 m	3.387 m	2.700 m	46
14.306 m	3.387 m	2.700 m	47

1 x Cortem LifEx-M..-0645

Type	Line arrangement
1st luminaire (X/Y/Z)	4.025 m / 29.138 m / 6.470 m
X-direction	1 pcs., Centre - centre, Distances not equal
Arrangement	A14

X	Y	Mounting height	Luminaire
4.025 m	29.138 m	6.470 m	21

1 x Cortem LifEx-M..-0645

Type	Line arrangement
1st luminaire (X/Y/Z)	15.936 m / 29.392 m / 6.470 m
X-direction	1 pcs., Centre - centre, Distances not equal
Arrangement	A15

X	Y	Mounting height	Luminaire
15.936 m	29.392 m	6.470 m	20

UPPER DECK

Luminaire layout plan

2 x Cortem LifEx-M..-0645

Type	Line arrangement
1st luminaire (X/Y/Z)	7.455 m / 12.007 m / 6.970 m
X-direction	2 pcs., Centre - centre, Distances not equal
Arrangement	A12

X	Y	Mounting height	Luminaire
7.455 m	12.007 m	6.970 m	40
11.958 m	12.007 m	6.970 m	41

6 x Stahl 6009/4148-2103-162-1110-11-850011

Type	Line arrangement
1st luminaire (X/Y/Z)	0.039 m / 10.192 m / 2.700 m
X-direction	6 pcs., Centre - centre, Distances not equal
Arrangement	A18

X	Y	Mounting height	Luminaire
0.039 m	10.192 m	2.700 m	33
0.039 m	20.092 m	2.700 m	35
0.039 m	29.892 m	2.700 m	37

3 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	8.970 m / 0.050 m / 2.800 m
X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A1

X	Y	Mounting height	Luminaire
8.970 m	0.050 m	2.800 m	49

2 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement

X	Y	Mounting height	Luminaire

UPPER DECK

Luminaire layout plan

1st luminaire (X/Y/Z)	0.114 m / 39.488 m / 2.700 m
X-direction	2 pcs., Centre - centre, Distances not equal
Arrangement	A19

X	Y	Mounting height	Luminaire
0.114 m	39.488 m	2.700 m	10

3 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	9.814 m / 11.988 m / 3.000 m
X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A5

X	Y	Mounting height	Luminaire
9.814 m	11.988 m	3.000 m	43

1 x Cortem LifEx-M..-0645

Type	Line arrangement
1st luminaire (X/Y/Z)	14.994 m / 39.363 m / 3.000 m
X-direction	1 pcs., Centre - centre, Distances not equal
Arrangement	A20

X	Y	Mounting height	Luminaire
14.994 m	39.363 m	3.000 m	5

1 x Cortem LifEx-M..-0645

Type	Line arrangement
1st luminaire (X/Y/Z)	13.514 m / 33.979 m / 2.700 m
X-direction	1 pcs., Centre - centre, 7.780 m

X	Y	Mounting height	Luminaire
13.514 m	33.979 m	2.700 m	11

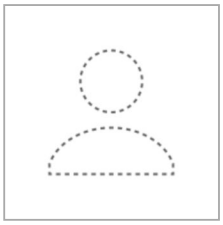
UPPER DECK

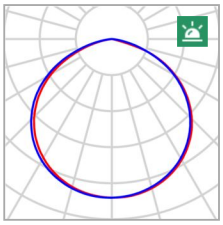
Luminaire layout plan

Arrangement	A22

UPPER DECK

Luminaire layout plan





Manufacturer	Cortem
Article No.	LifEx-M..-1260 (40W)
Article name	LifEx-M..-1260 (40W)
Fitting	1x LifEx-M..-1260 (40W)

P	60.0 W
$P_{Emergency\ lighting}$	11.3 W
$\Phi_{Luminaire}$	6200 lm
$\Phi_{Emergency\ lighting}$	1168 lm
ELF	19 %

3 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	0.985 m / 0.050 m / 2.800 m
X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A1

X	Y	Mounting height	Luminaire
0.985 m	0.050 m	2.800 m	48
18.367 m	0.050 m	2.800 m	50

1 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	-3.681 m / 38.605 m / 2.700 m
X-direction	1 pcs., Centre - centre, Distances not equal
Arrangement	A3

X	Y	Mounting height	Luminaire
-3.681 m	38.605 m	2.700 m	6

7 x Cortem LifEx-M..-1260 (40W)

UPPER DECK

Luminaire layout plan

Type	Line arrangement
1st luminaire (X/Y/Z)	19.359 m / 34.682 m / 2.700 m
X-direction	7 pcs., Centre - centre, Distances not equal
Arrangement	A4

X	Y	Mounting height	Luminaire
19.359 m	34.682 m	2.700 m	25
19.359 m	25.119 m	2.700 m	27
19.359 m	14.527 m	2.700 m	29
19.359 m	3.645 m	2.700 m	31

3 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	4.181 m / 11.988 m / 3.000 m
X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A5

X	Y	Mounting height	Luminaire
4.181 m	11.988 m	3.000 m	42
15.356 m	11.988 m	3.000 m	44

3 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	4.584 m / 32.350 m / 6.470 m
X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A6

X	Y	Mounting height	Luminaire
4.584 m	32.350 m	6.470 m	14
15.013 m	32.350 m	6.470 m	16

2 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	6.444 m / 32.351 m / 3.000 m

X	Y	Mounting height	Luminaire
6.444 m	32.351 m	3.000 m	12
13.244 m	32.351 m	3.000 m	13

UPPER DECK

Luminaire layout plan

X-direction	2 pcs., Centre - centre, Distances not equal
Arrangement	A7

3 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	5.439 m / 32.311 m / 10.870 m
X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A8

X	Y	Mounting height	Luminaire
5.439 m	32.311 m	10.870 m	17
13.979 m	32.311 m	10.870 m	19

2 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	4.977 m / 36.788 m / 3.000 m
X-direction	2 pcs., Centre - centre, Distances not equal
Arrangement	A9

X	Y	Mounting height	Luminaire
4.977 m	36.788 m	3.000 m	7

3 x Cortem LifEx-M..-0645

Type	Line arrangement
1st luminaire (X/Y/Z)	9.532 m / 26.970 m / 10.870 m
X-direction	3 pcs., Centre - centre, Distances not equal
Arrangement	A10

X	Y	Mounting height	Luminaire
9.532 m	26.970 m	10.870 m	23

UPPER DECK

Luminaire layout plan

1 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	22.772 m / 11.608 m / 2.700 m
X-direction	1 pcs., Centre - centre, Distances not equal
Arrangement	A11

X	Y	Mounting height	Luminaire
22.772 m	11.608 m	2.700 m	45

1 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	3.210 m / 15.197 m / 6.970 m
X-direction	1 pcs., Centre - centre, Distances not equal
Arrangement	A16

X	Y	Mounting height	Luminaire
3.210 m	15.197 m	6.970 m	38

1 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	16.159 m / 15.067 m / 6.970 m
X-direction	1 pcs., Centre - centre, Distances not equal
Arrangement	A17

X	Y	Mounting height	Luminaire
16.159 m	15.067 m	6.970 m	39

6 x Stahl 6009/4148-2103-162-1110-11-850011

Type	Line arrangement

X	Y	Mounting height	Luminaire

UPPER DECK

Luminaire layout plan

1st luminaire (X/Y/Z)	0.039 m / 4.832 m / 2.700 m
X-direction	6 pcs., Centre - centre, Distances not equal
Arrangement	A18

X	Y	Mounting height	Luminaire
0.039 m	4.832 m	2.700 m	32
0.039 m	14.732 m	2.700 m	34
0.039 m	24.514 m	2.700 m	36

2 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	0.114 m / 33.014 m / 2.700 m
X-direction	2 pcs., Centre - centre, Distances not equal
Arrangement	A19

X	Y	Mounting height	Luminaire
0.114 m	33.014 m	2.700 m	9

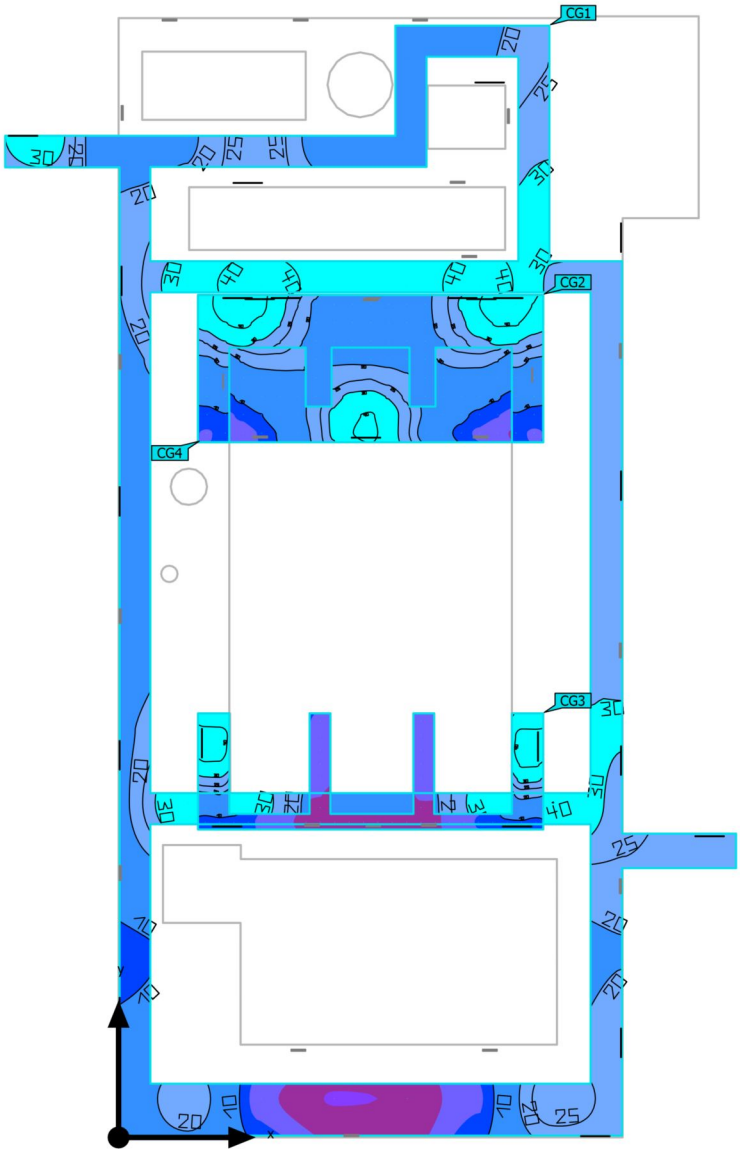
1 x Cortem LifEx-M..-1260 (40W)

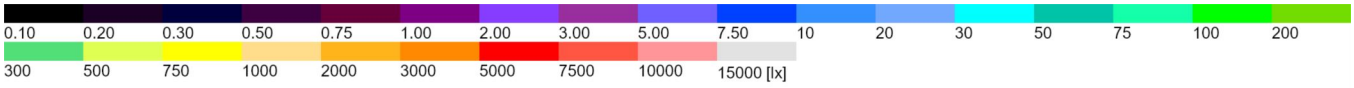
Type	Line arrangement
1st luminaire (X/Y/Z)	14.298 m / 40.658 m / 3.000 m
X-direction	1 pcs., Centre - centre, 4.635 m
Arrangement	A21

X	Y	Mounting height	Luminaire
14.298 m	40.658 m	3.000 m	4

UPPER DECK (Emergency light scene)

Calculation objects





UPPER DECK (Emergency light scene)

Calculation objects

Working planes

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
Working plane (UPPER DECK-WALKWAY) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	20.7 lx	2.84 lx	40.4 lx	0.14	0.070	WP1
Working plane (HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-1) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	22.4 lx	7.09 lx	47.7 lx	0.32	0.15	WP2
Working plane (HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-2) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	19.9 lx	3.99 lx	41.6 lx	0.20	0.096	WP3
Working plane (HYDROGEN STORAGE-SOUTH PLATFORM) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	17.3 lx	3.04 lx	45.5 lx	0.18	0.067	WP4

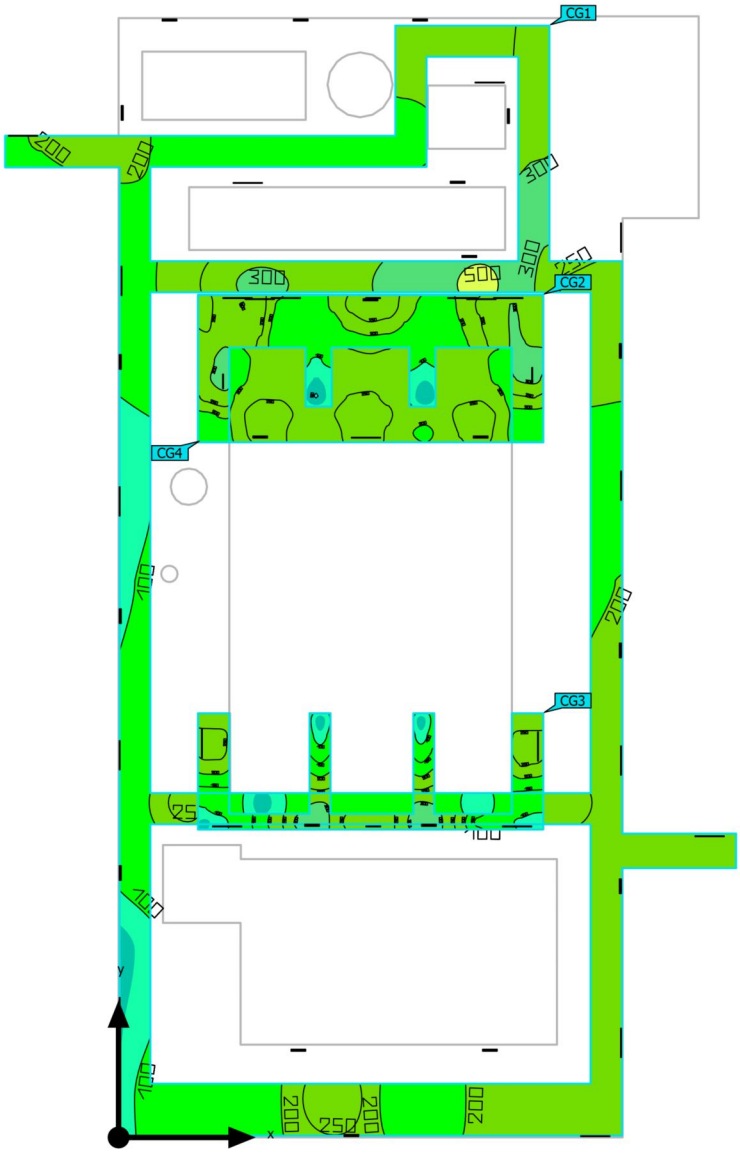
Calculation surfaces

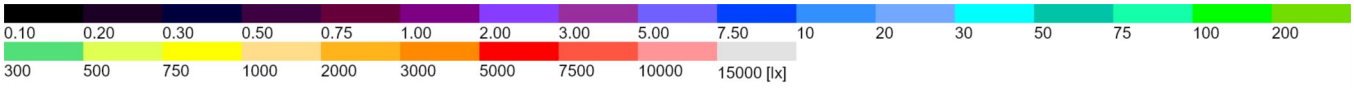
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
UPPER DECK-ESCAPE ROUTE Horizontal illuminance Height: 0.000 m	23.8 lx	2.91 lx	48.0 lx	0.12	0.061	CG1
HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-2 Horizontal illuminance Height: 0.000 m	19.9 lx	3.90 lx	42.1 lx	0.20	0.093	CG2
HYDROGEN STORAGE-SOUTH PLATFORM Horizontal illuminance Height: 0.000 m	17.3 lx	3.04 lx	45.9 lx	0.18	0.066	CG3
HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-1 Horizontal illuminance Height: 0.000 m	22.5 lx	7.26 lx	48.5 lx	0.32	0.15	CG4

Notes on planning:
The emergency lighting scene was calculated without reflection and without taking into account the placed furniture.

UPPER DECK (Normal Lighting)

Calculation objects





UPPER DECK (Normal Lighting)

Calculation objects

Working planes

Properties	Ē (Target)	E_{min}	E_{max}	U_o (g_1) (Target)	g_2	Index
Working plane (UPPER DECK-WALKWAY) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	193 lx (≥ 150 lx)	48.7 lx	549 lx	0.25 (≥ 0.25)	0.089	WP1
Working plane (HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-1) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	217 lx (≥ 150 lx)	56.6 lx	323 lx	0.26 (≥ 0.25)	0.18	WP2
Working plane (HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-2) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	216 lx (≥ 150 lx)	109 lx	307 lx	0.50 (≥ 0.25)	0.36	WP3
Working plane (HYDROGEN STORAGE-SOUTH PLATFORM) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	199 lx (≥ 150 lx)	72.3 lx	330 lx	0.36 (≥ 0.25)	0.22	WP4

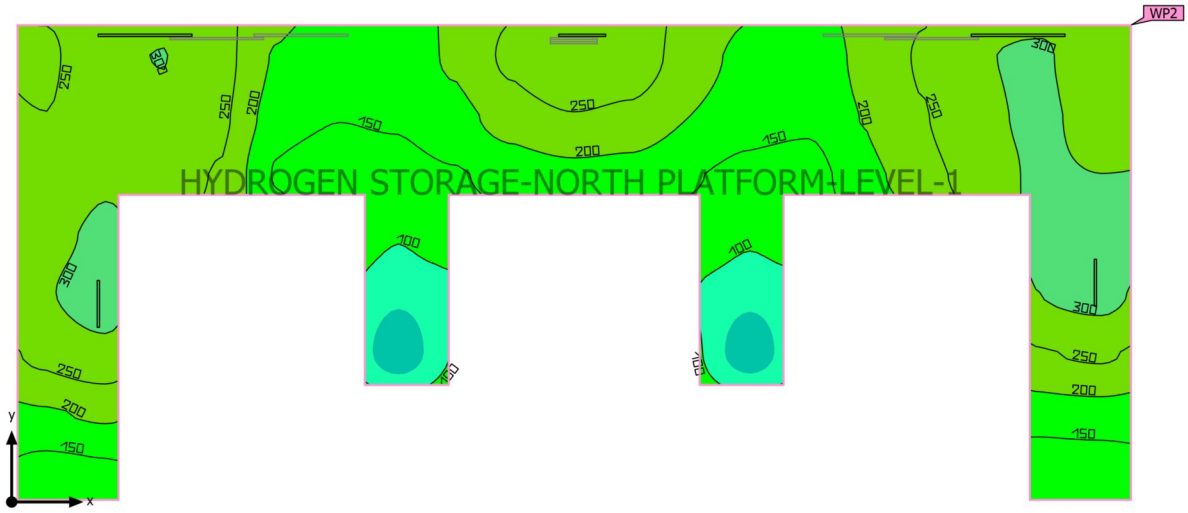
Calculation surfaces

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
UPPER DECK-ESCAPE ROUTE Horizontal illuminance Height: 0.000 m	220 lx	68.1 lx	545 lx	0.31	0.12	CG1
HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-2 Horizontal illuminance Height: 0.000 m	217 lx	109 lx	309 lx	0.50	0.35	CG2
HYDROGEN STORAGE-SOUTH PLATFORM Horizontal illuminance Height: 0.000 m	199 lx	61.8 lx	338 lx	0.31	0.18	CG3
HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-1 Horizontal illuminance Height: 0.000 m	215 lx	48.2 lx	322 lx	0.22	0.15	CG4

Utilisation profile: Offshore gas and oil structures (5.8.7 Pipe rack area/deck)

UPPER DECK · HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-1 (Normal Lighting)

Summary





Ground area	40.30 m²
Maintenance factor	0.80 (fixed)

Mounting height	2.800 m
Height Working plane	0.000 m
Wall zone Working plane	0.000 m

UPPER DECK · HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-1 (Normal Lighting)

Summary

Results

	Symbol	Calculated	Target	Index
Working plane	$\bar{E}_{perpendicular}$	217 lx	≥ 150 lx	WP2
	U_o (g_1)	0.26	≥ 0.25	WP2
Energy estimation(2)	Consumption	894 kWh/a	max. 22650 kWh/a	
Space	Lighting power density	6.33 W/m²	–	
		2.91 W/m²/100 lx	–	

(1) Based on a rectangular space of 5.675 m x 13.300 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

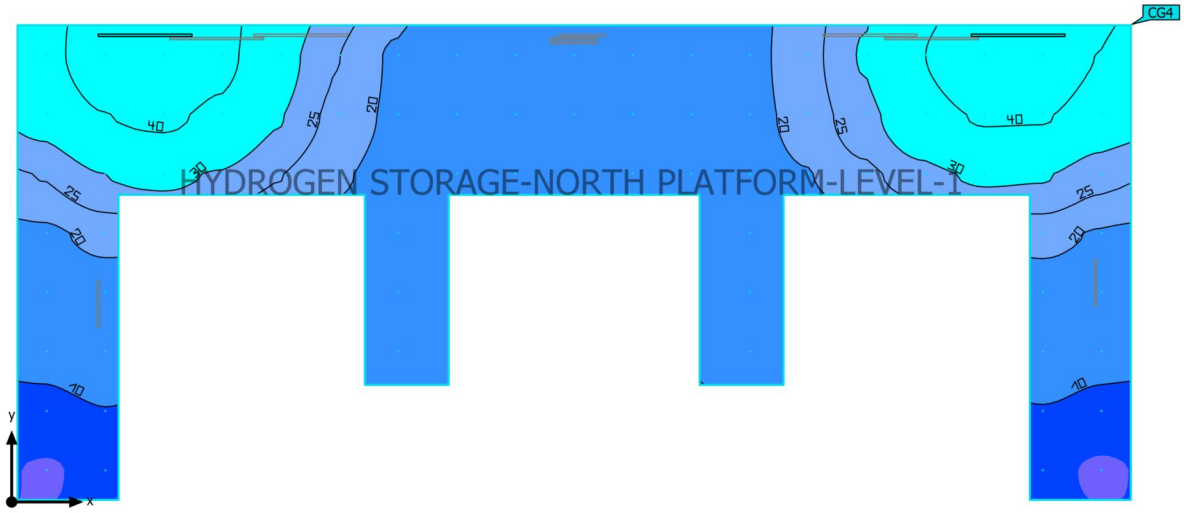
Utilisation profile: Offshore gas and oil structures (5.8.7 Pipe rack area/deck)

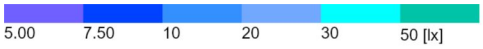
Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
3	Cortem	LifEx-M..-0645	LifEx-M..-0645	–	45.0 W	6199 lm	137.8 lm/W
2	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)	–	60.0 W	6200 lm	103.3 lm/W
				–	11.3 W	1168 lm (19 %)	-

HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-1 (Emergency light scene)

Calculation objects





HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-1 (Emergency light scene)

Calculation objects

Working planes

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
Working plane (HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-1) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	22.4 lx	7.09 lx	47.7 lx	0.32	0.15	WP2

Calculation surfaces

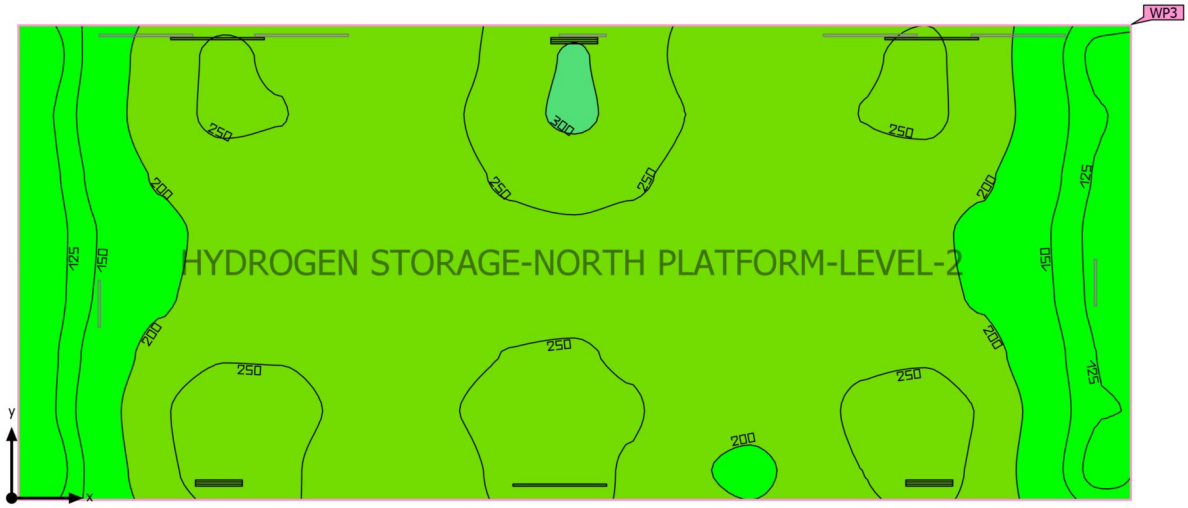
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-1 Horizontal illuminance Height: 0.000 m	22.5 lx	7.26 lx	48.5 lx	0.32	0.15	CG4

(1) Based on a rectangular space of 5.675 m x 13.300 m and SHR of 0.25.

Notes on planning:
The emergency lighting scene was calculated without reflection and without taking into account the placed furniture.

HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-2 (Normal Lighting)

Summary





Ground area	75.48 m²
Maintenance factor	0.80 (fixed)

Mounting height	2.700 m
Height Working plane	0.000 m
Wall zone Working plane	0.000 m

HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-2 (Normal Lighting)

Summary

Results

	Symbol	Calculated	Target	Index
Working plane	$\bar{E}_{perpendicular}$	216 lx	≥ 150 lx	WP3
	U_o (g_1)	0.50	≥ 0.25	WP3
Energy estimation(2)	Consumption	1104 kWh/a	max. 22650 kWh/a	
Space	Lighting power density	4.17 W/m²	–	
		1.93 W/m²/100 lx	–	

(1) Based on a rectangular space of 5.675 m x 13.300 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

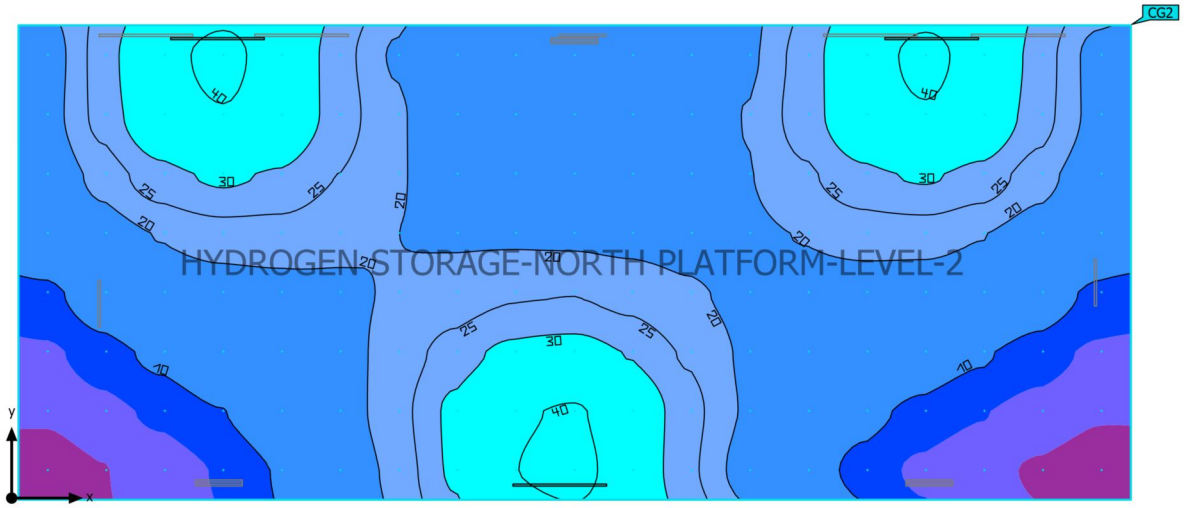
Utilisation profile: Offshore gas and oil structures (5.8.7 Pipe rack area/deck)

Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
3	Cortem	LifEx-M..-0645	LifEx-M..-0645	–	45.0 W	6199 lm	137.8 lm/W
3	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)	–	60.0 W	6200 lm	103.3 lm/W
				–	11.3 W	1168 lm (19 %)	-

HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-2 (Emergency light scene)

Calculation objects





HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-2 (Emergency light scene)

Calculation objects

Working planes

Properties	$\bar{E}$	E_{min}	E_{max}	U_o (g_1)	g_2	Index
Working plane (HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-2) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	19.9 lx	3.99 lx	41.6 lx	0.20	0.096	WP3

Calculation surfaces

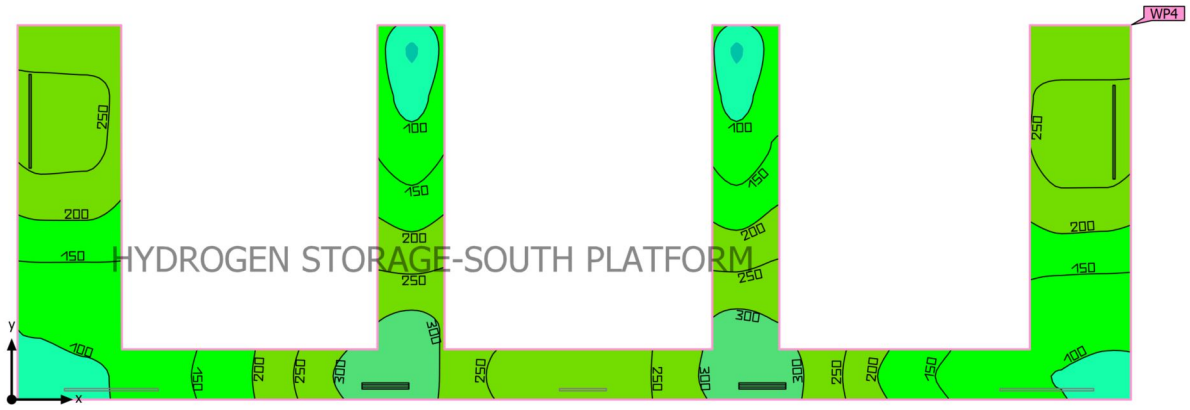
Properties	$\bar{E}$	E_{min}	E_{max}	U_o (g_1)	g_2	Index
HYDROGEN STORAGE-NORTH PLATFORM-LEVEL-2 Horizontal illuminance Height: 0.000 m	19.9 lx	3.90 lx	42.1 lx	0.20	0.093	CG2

(1) Based on a rectangular space of 5.675 m x 13.300 m and SHR of 0.25.

Notes on planning:
The emergency lighting scene was calculated without reflection and without taking into account the placed furniture.

UPPER DECK · HYDROGEN STORAGE-SOUTH PLATFORM (Normal Lighting)

Summary





Ground area	23.67 m²
Maintenance factor	0.80 (fixed)

Mounting height	2.500 m
Height Working plane	0.000 m
Wall zone Working plane	0.000 m

UPPER DECK · HYDROGEN STORAGE-SOUTH PLATFORM (Normal Lighting)

Summary

Results

	Symbol	Calculated	Target	Index
Working plane	$\bar{E}_{perpendicular}$	199 lx	≥ 150 lx	WP4
	U_o (g_1)	0.36	≥ 0.25	WP4
Energy estimation(2)	Consumption	736 kWh/a	max. 19450 kWh/a	
Space	Lighting power density	8.87 W/m²	–	
		4.45 W/m²/100 lx	–	

(1) Based on a rectangular space of 13.300 m x 4.475 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

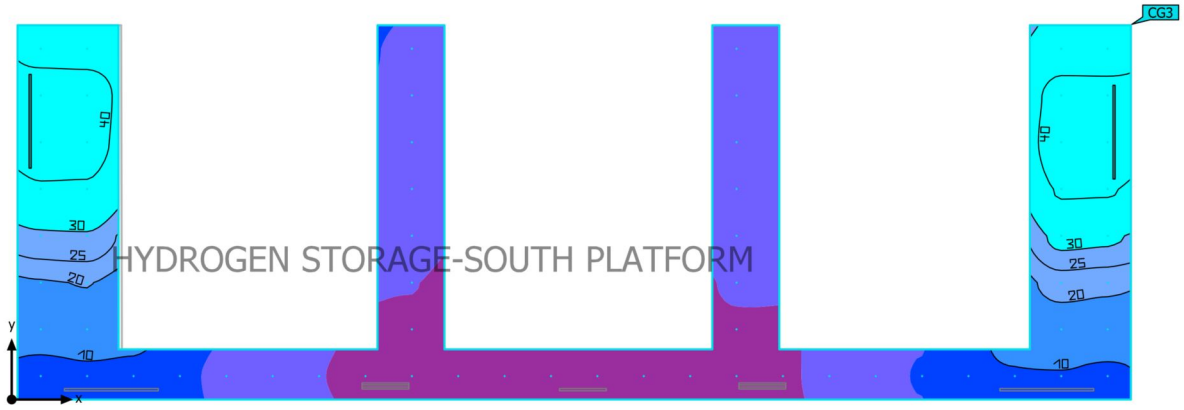
Utilisation profile: Offshore gas and oil structures (5.8.7 Pipe rack area/deck)

Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
2	Cortem	LifEx-M..-0645	LifEx-M..-0645	–	45.0 W	6199 lm	137.8 lm/W
2	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)	–	60.0 W	6200 lm	103.3 lm/W
				–	11.3 W	1168 lm (19 %)	-

HYDROGEN STORAGE-SOUTH PLATFORM (Emergency light scene)

Calculation objects





HYDROGEN STORAGE-SOUTH PLATFORM (Emergency light scene)

Calculation objects

Working planes

Properties	$\bar{E}$	E_{min}	E_{max}	U_o (g_1)	g_2	Index
Working plane (HYDROGEN STORAGE-SOUTH PLATFORM) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	17.3 lx	3.04 lx	45.5 lx	0.18	0.067	WP4

Calculation surfaces

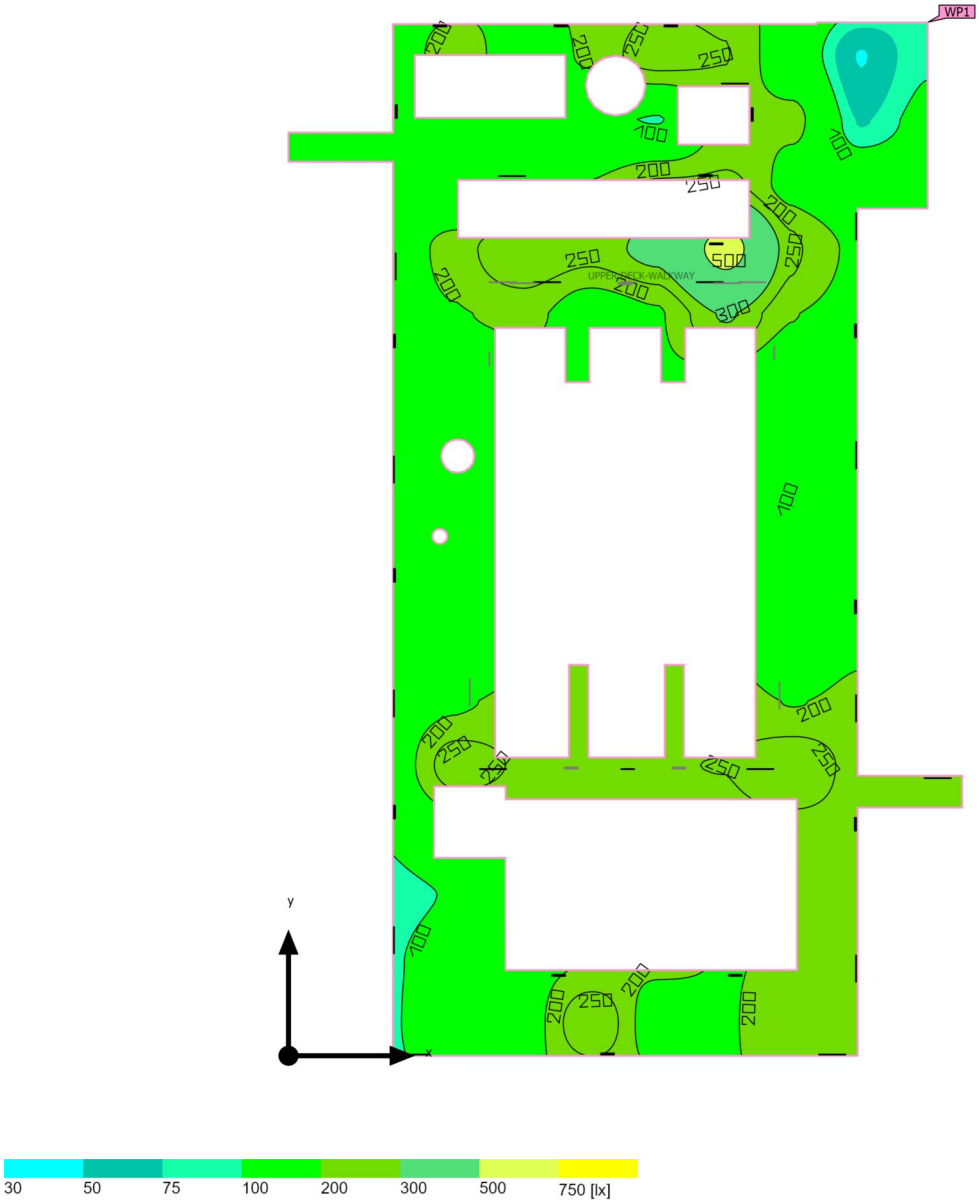
Properties	$\bar{E}$	E_{min}	E_{max}	U_o (g_1)	g_2	Index
HYDROGEN STORAGE-SOUTH PLATFORM Horizontal illuminance Height: 0.000 m	17.3 lx	3.04 lx	45.9 lx	0.18	0.066	CG3

(1) Based on a rectangular space of 13.300 m x 4.475 m and SHR of 0.25.

Notes on planning:
The emergency lighting scene was calculated without reflection and without taking into account the placed furniture.

UPPER DECK · UPPER DECK-WALKWAY (Normal Lighting)

Summary



Ground area	530.77 m²
Maintenance factor	0.80 (fixed)

Mounting height	2.700 m – 3.000 m
Height Working plane	0.000 m
Wall zone Working plane	0.000 m

UPPER DECK · UPPER DECK-WALKWAY (Normal Lighting)

Summary

Results

	Symbol	Calculated	Target	Index
Working plane	$\bar{E}_{perpendicular}$	193 lx	≥ 150 lx	WP1
	U_o (g_1)	0.25	≥ 0.25	WP1
Energy estimation(2)	Consumption	6255 kWh/a	max. 23500 kWh/a	
Space	Lighting power density	3.36 W/m²	–	
		1.74 W/m²/100 lx	–	

(1) Based on a rectangular space of 43.210 m x 28.160 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

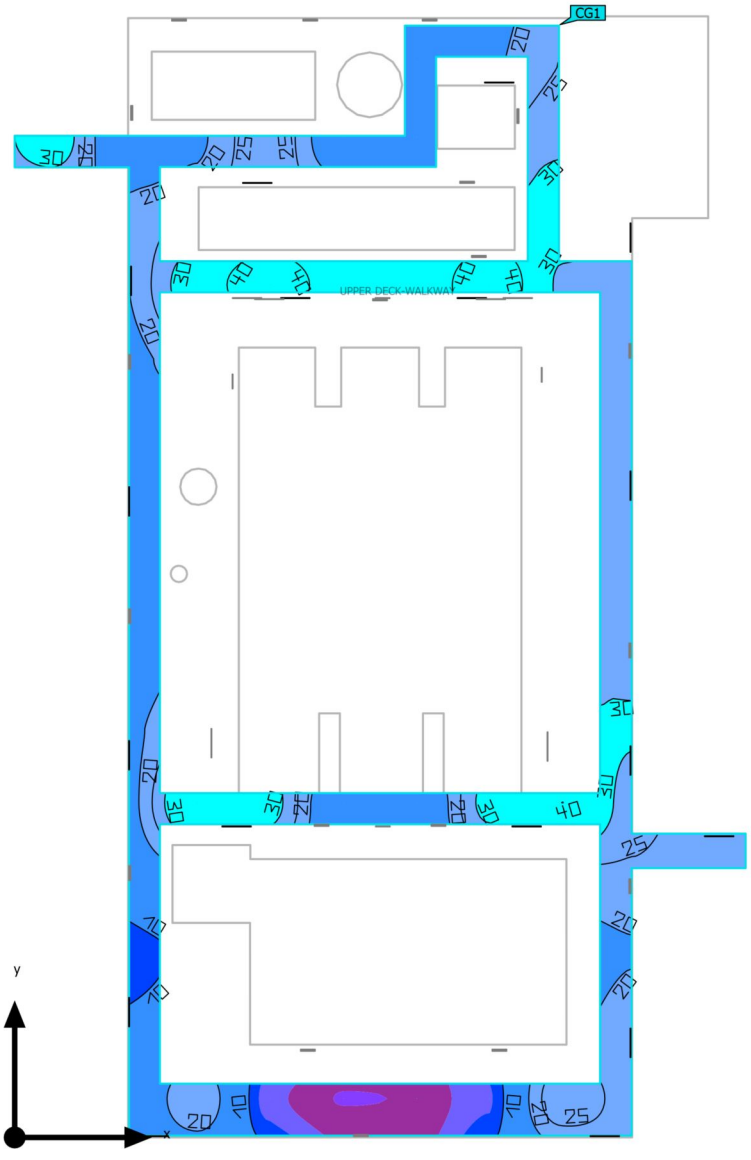
Utilisation profile: Offshore gas and oil structures (5.8.7 Pipe rack area/deck)

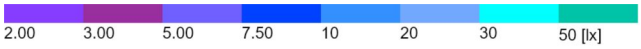
Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
17	Cortem	LifEx-M..-0645	LifEx-M..-0645	–	45.0 W	6199 lm	137.8 lm/W
17	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)	–	60.0 W	6200 lm	103.3 lm/W
				–	11.3 W	1168 lm (19 %)	-

UPPER DECK-WALKWAY (Emergency light scene)

Calculation objects





UPPER DECK-WALKWAY (Emergency light scene)

Calculation objects

Working planes

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
Working plane (UPPER DECK-WALKWAY) Perpendicular illuminance Height: 0.000 m, Wall zone: 0.000 m	20.7 lx	2.84 lx	40.4 lx	0.14	0.070	WP1

Calculation surfaces

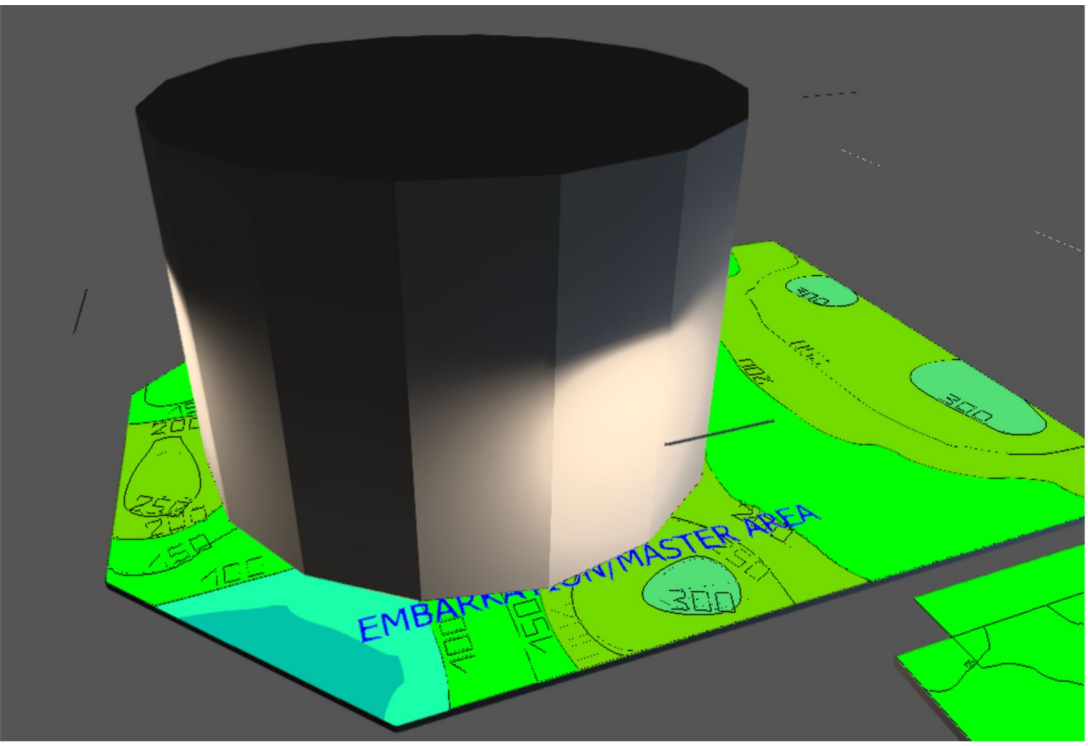
Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
UPPER DECK-ESCAPE ROUTE Horizontal illuminance Height: 0.000 m	23.8 lx	2.91 lx	48.0 lx	0.12	0.061	CG1

(1) Based on a rectangular space of 43.210 m x 28.160 m and SHR of 0.25.

Notes on planning:
The emergency lighting scene was calculated without reflection and without taking into account the placed furniture.

7 ANNEXES – III – BELOW LOWER DECK LIGHTING CALCULATION

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Base Load Power Hub (BLPH) - BELOW LOWER DECK LIGHTING CALCULATION

Created with DIALux

DIALux

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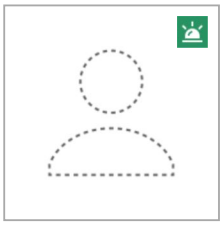
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Product data sheet

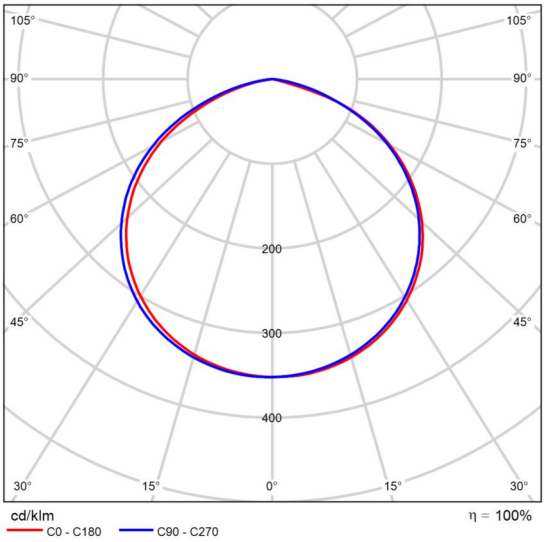
Cortem - LifEx-M..-1260 (40W)



Article No.	LifEx-M..-1260 (40W)
P	60.0 W
$P_{Emergency\ lighting}$	11.3 W
Φ_{Lamp}	6200 lm
$\Phi_{Luminaire}$	6200 lm
$\Phi_{Emergency\ lighting}$	1168 lm
η	100.00 %
Luminous efficacy	103.3 lm/W
CCT	5000 K
CRI	100
ELF	19 %

γ	C0°	C90°	C0°- C360°
0°-180°	2182.78	2182.78	2182.78
60°-90°	1013.99	988.94	1034.84

Glare valuation table [cd]



Polar LDC

BELOW LOWER DECK · EMBARKATION/MASTER AREA (Normal Lighting)

Summary





Ground area	67.57 m²
Maintenance factor	0.80 (fixed)

Mounting height	2.500 m – 4.270 m
Height Working plane	0.000 m
Wall zone Working plane	0.000 m

BELOW LOWER DECK · EMBARKATION/MASTER AREA (Normal Lighting)

Summary

Results

	Symbol	Calculated	Target	Index
Working plane	$\bar{E}_{perpendicular}$	193 lx	≥ 100 lx	WP6
	U_o (g_1)	0.36	≥ 0.25	WP6
Energy estimation(2)	Consumption	2208 kWh/a	max. 2400 kWh/a	
Space	Lighting power density	5.33 W/m²	–	
		2.76 W/m²/100 lx	–	

(1) Based on a rectangular space of 12.600 m x 9.200 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

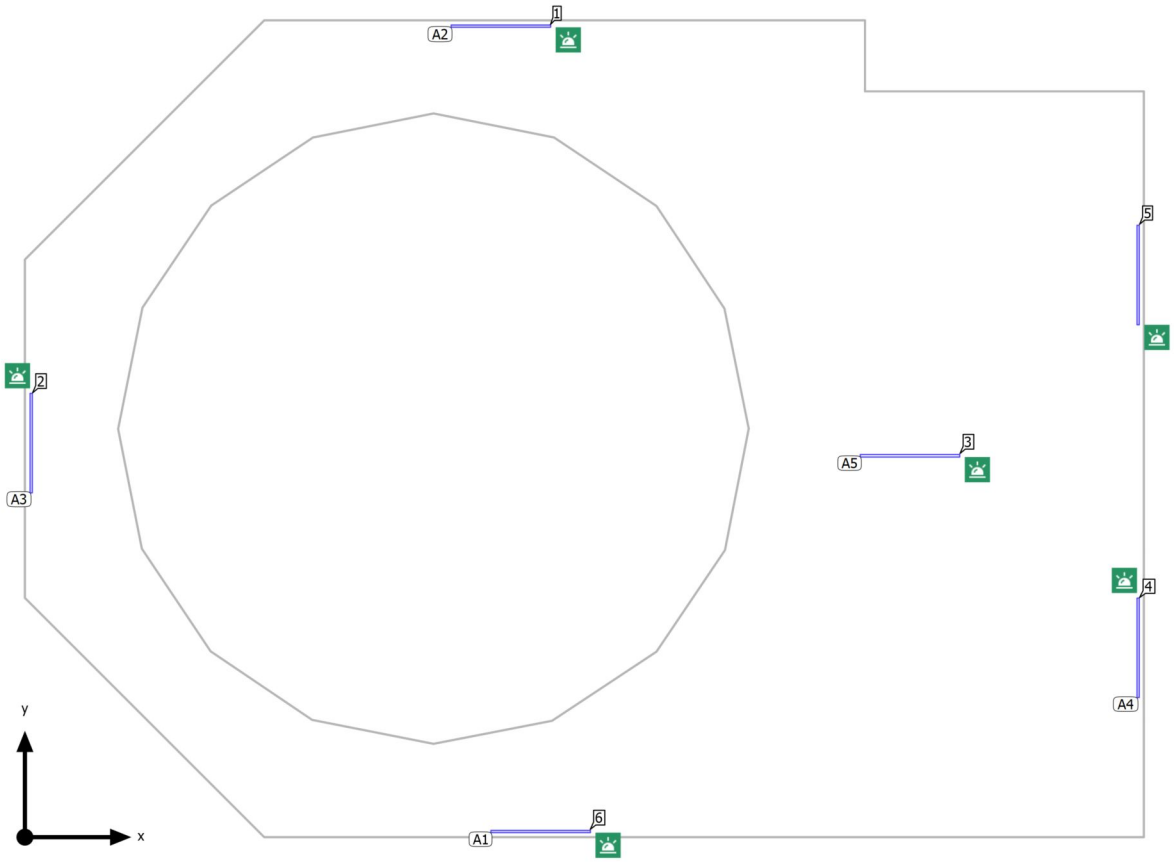
Utilisation profile: Offshore gas and oil structures (5.8.3 Boat landing areas, transport areas)

Luminaire list

pcs.	Manufacturer	Article No.	Article name		R_{UG}	P	Φ	Luminous efficacy
6	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)		–	60.0 W	6200 lm	103.3 lm/W
					–	11.3 W	1168 lm (19 %)	-

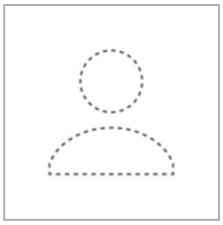
EMBARKATION/MASTER AREA

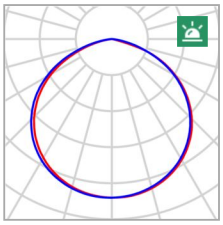
Luminaire layout plan



EMBARKATION/MASTER AREA

Luminaire layout plan





Manufacturer	Cortem
Article No.	LifEx-M..-1260 (40W)
Article name	LifEx-M..-1260 (40W)
Fitting	1x LifEx-M..-1260 (60W)

P	60.0 W
$P_{Emergency\ lighting}$	11.3 W
$\Phi_{Luminaire}$	6200 lm
$\Phi_{Emergency\ lighting}$	1168 lm
ELF	19 %

1 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	5.808 m / 0.063 m / 2.500 m
X-direction	1 pcs., Centre - centre, 5.138 m
Arrangement	A1

X	Y	Mounting height	Luminaire
5.808 m	0.063 m	2.500 m	6

1 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	5.360 m / 9.135 m / 2.500 m
X-direction	1 pcs., Centre - centre, 4.990 m
Arrangement	A2

X	Y	Mounting height	Luminaire
5.360 m	9.135 m	2.500 m	1

1 x Cortem LifEx-M..-1260 (40W)

EMBARKATION/MASTER AREA

Luminaire layout plan

Type	Line arrangement
1st luminaire (X/Y/Z)	0.071 m / 4.438 m / 2.500 m
X-direction	1 pcs., Centre - centre, Distances not equal
Arrangement	A3

X	Y	Mounting height	Luminaire
0.071 m	4.438 m	2.500 m	2

2 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	12.536 m / 2.133 m / 2.500 m
X-direction	2 pcs., Centre - centre, 4.199 m
Arrangement	A4

X	Y	Mounting height	Luminaire
12.536 m	2.133 m	2.500 m	4
12.536 m	6.331 m	2.500 m	5

1 x Cortem LifEx-M..-1260 (40W)

Type	Line arrangement
1st luminaire (X/Y/Z)	9.967 m / 4.295 m / 4.270 m
X-direction	1 pcs., Centre - centre, Distances not equal
Arrangement	A5

X	Y	Mounting height	Luminaire
9.967 m	4.295 m	4.270 m	3

EMBARKATION/MASTER AREA

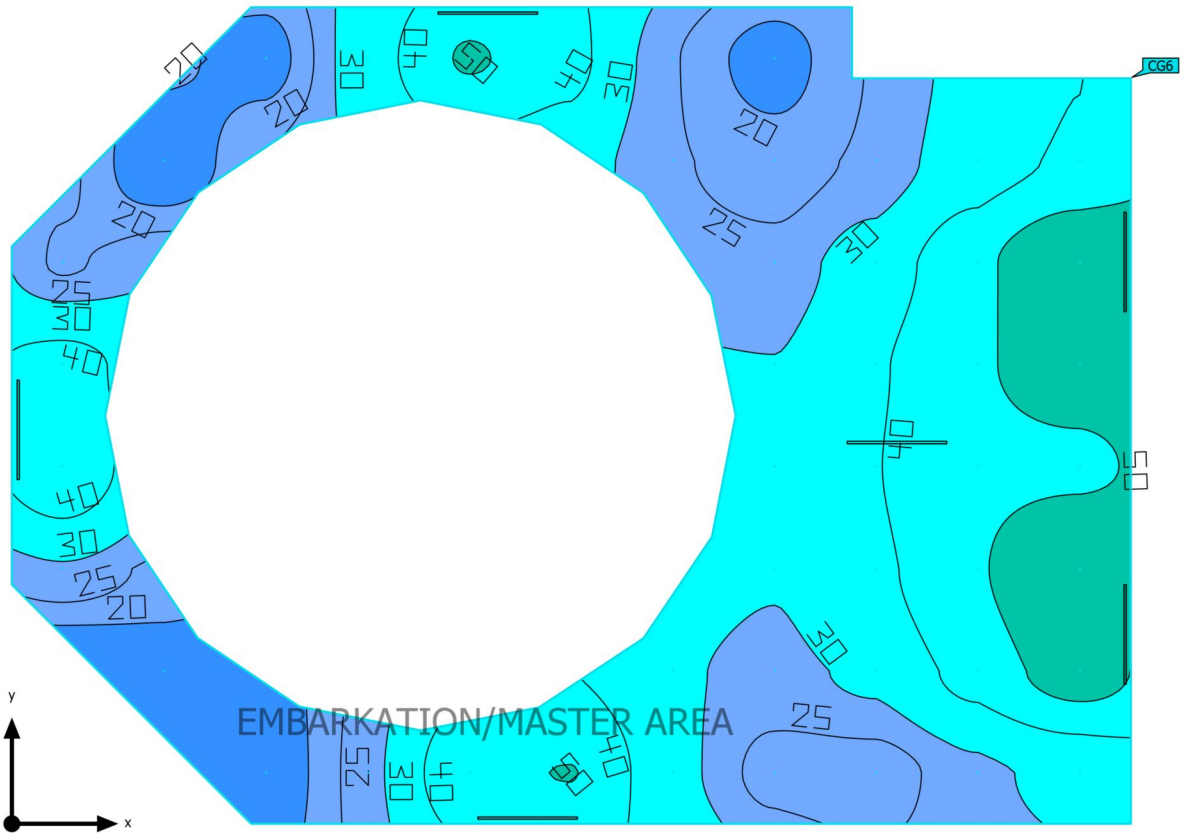
Luminaire list

Φ_{total}	P_{total}	Luminous efficacy	$\Phi_{Emergency\ lighting}$	$P_{Emergency\ lighting}$
37200 lm	360.0 W	103.3 lm/W	7008 lm	67.8 W

pcs.	Manufacturer	Article No.	Article name	P	Φ	Luminous efficacy
6	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)	60.0 W	6200 lm	103.3 lm/W
				11.3 W	1168 lm (19 %)	-

EMBARKATION/MASTER AREA (Emergency light scene)

Calculation objects





EMBARKATION/MASTER AREA (Emergency light scene)

Calculation objects

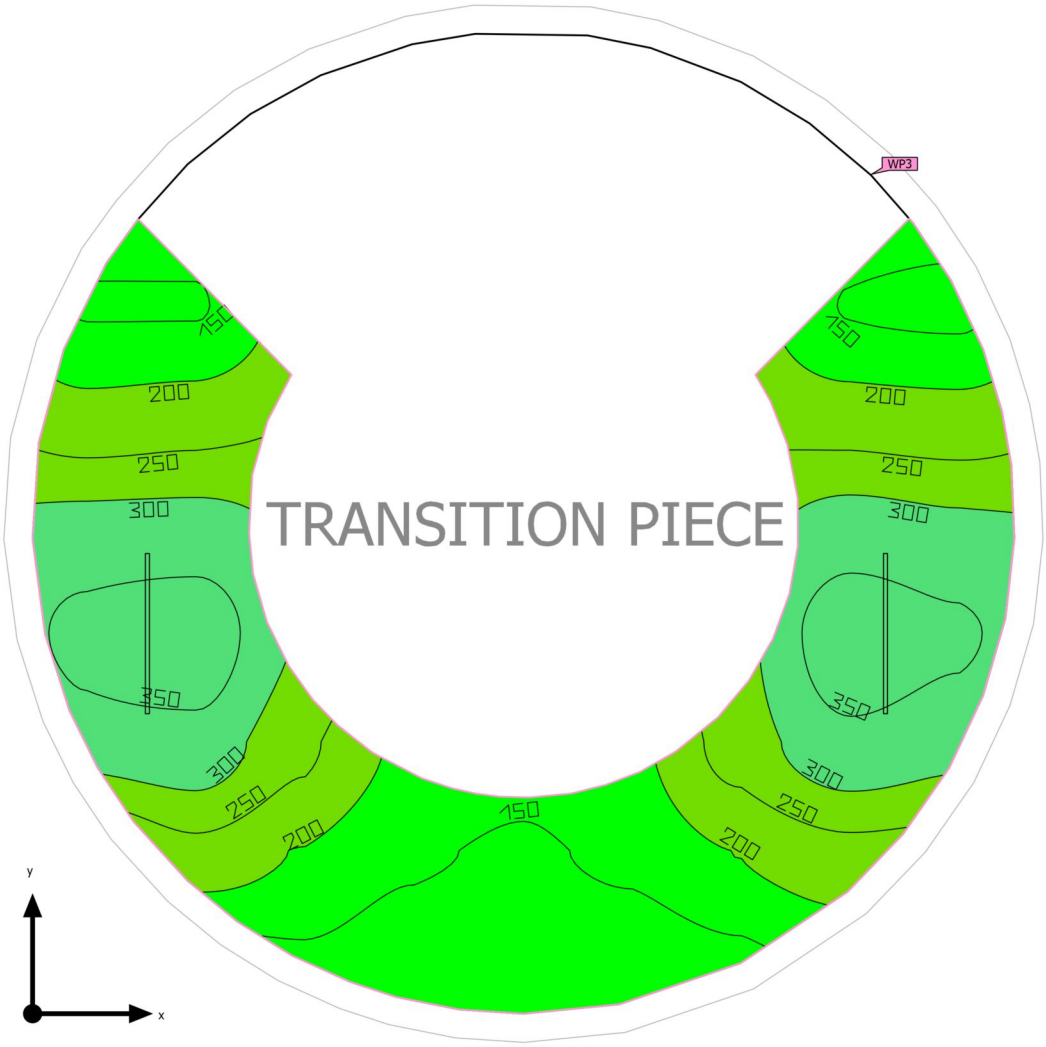
Calculation surfaces

Properties	Ē	E_{min}	E_{max}	U_o (g_1)	g_2	Index
EMBARKATION AREA Horizontal illuminance Height: 0.000 m	35.3 lx	14.3 lx	59.2 lx	0.41	0.24	CG6

Notes on planning:
The emergency lighting scene was calculated without reflection and without taking into account the placed furniture.

JB AREA · - · TRANSITION PIECE (Normal Lighting)

Summary



Ground area	36.86 m²	Clearance height	2.385 m
Reflection factors	Ceiling: 70.0 %, Walls: 50.0 %, Floor: 20.0 %	Mounting height	2.385 m
		Height Working plane	0.000 m
Maintenance factor	0.80 (fixed)	Wall zone Working plane	0.000 m

JB AREA · - · TRANSITION PIECE (Normal Lighting)

Summary

Results

	Symbol	Calculated	Target	Index
Working plane	$\bar{E}_{perpendicular}$	237 lx	≥ 200 lx	WP3
	U_o (g_1)	0.48	≥ 0.40	WP3
	Lighting power density	6.77 W/m²	–	
		2.86 W/m²/100 lx	–	
Energy estimation(2)	Consumption	270 kWh/a	max. 1300 kWh/a	
Room	Lighting power density	3.26 W/m²	–	
		1.37 W/m²/100 lx	–	

(1) Based on a rectangular space of 6.859 m x 6.822 m and SHR of 0.25.
(2) Calculated using DIN:18599-4.

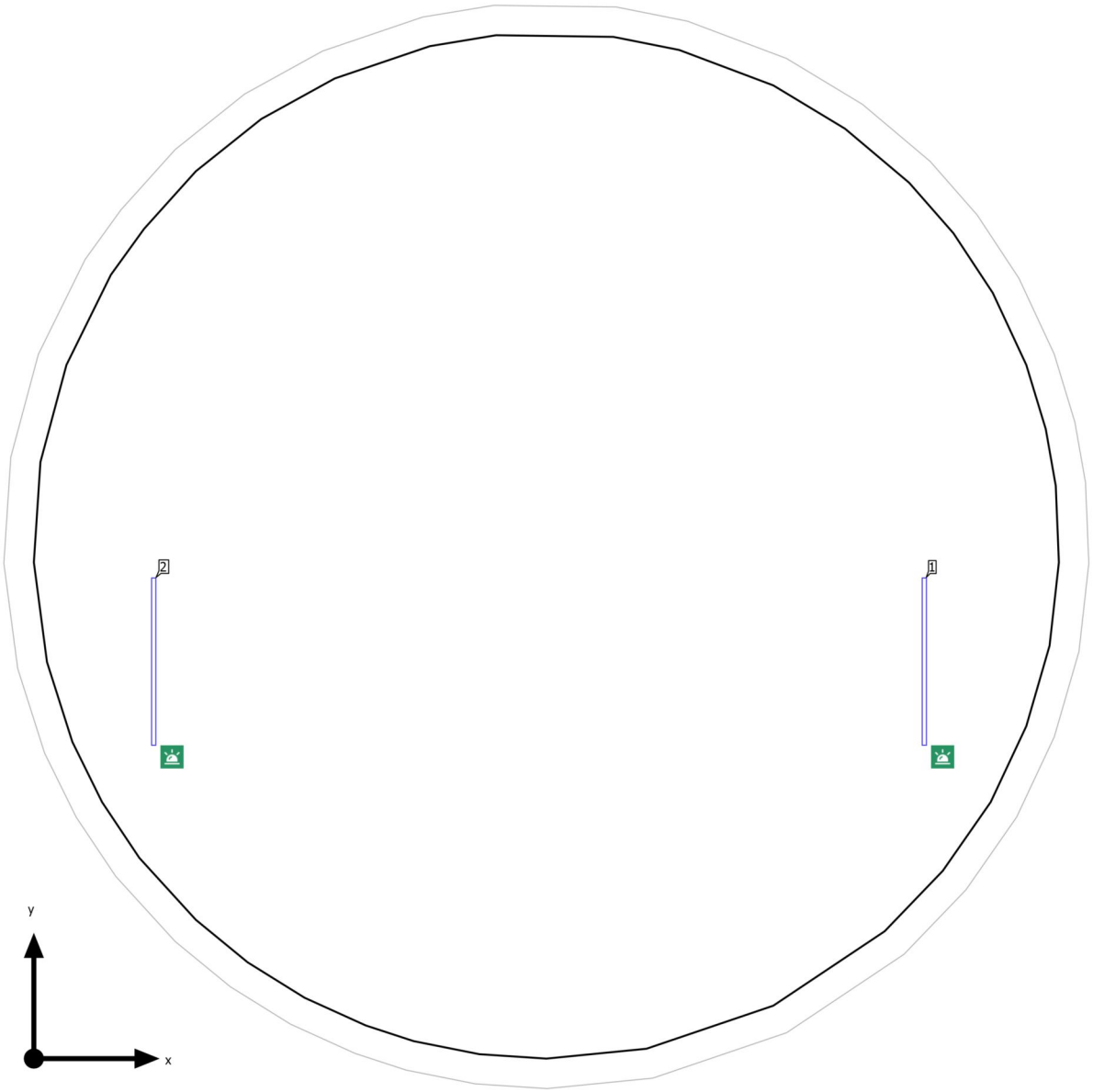
Utilisation profile: Industrial activities and crafts - Power stations (28.4 Side rooms, e.g. pump rooms, condenser rooms, switchboards)

Luminaire list

pcs.	Manufacturer	Article No.	Article name		R_{UG}	P	Φ	Luminous efficacy
2	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)		–	60.0 W	6200 lm	103.3 lm/W
					–	11.3 W	1168 lm (19 %)	-

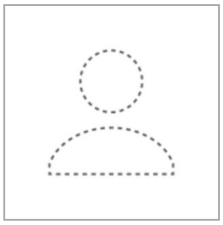
JB AREA · - · TRANSITION PIECE

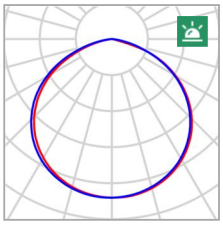
Luminaire layout plan



JB AREA · - · TRANSITION PIECE

Luminaire layout plan





Manufacturer	Cortem	P	60.0 W
Article No.	LifEx-M..-1260 (40W)	$P_{Emergency\ lighting}$	11.3 W
Article name	LifEx-M..-1260 (40W)	$\Phi_{Luminaire}$	6200 lm
Fitting	1x LifEx-M..-1260 (60W)	$\Phi_{Emergency\ lighting}$	1168 lm
		ELF	19 %

Individual luminaires

X	Y	Mounting height	Luminaire
5.962 m	2.658 m	2.385 m	1
0.802 m	2.658 m	2.385 m	2

JB AREA · - · TRANSITION PIECE

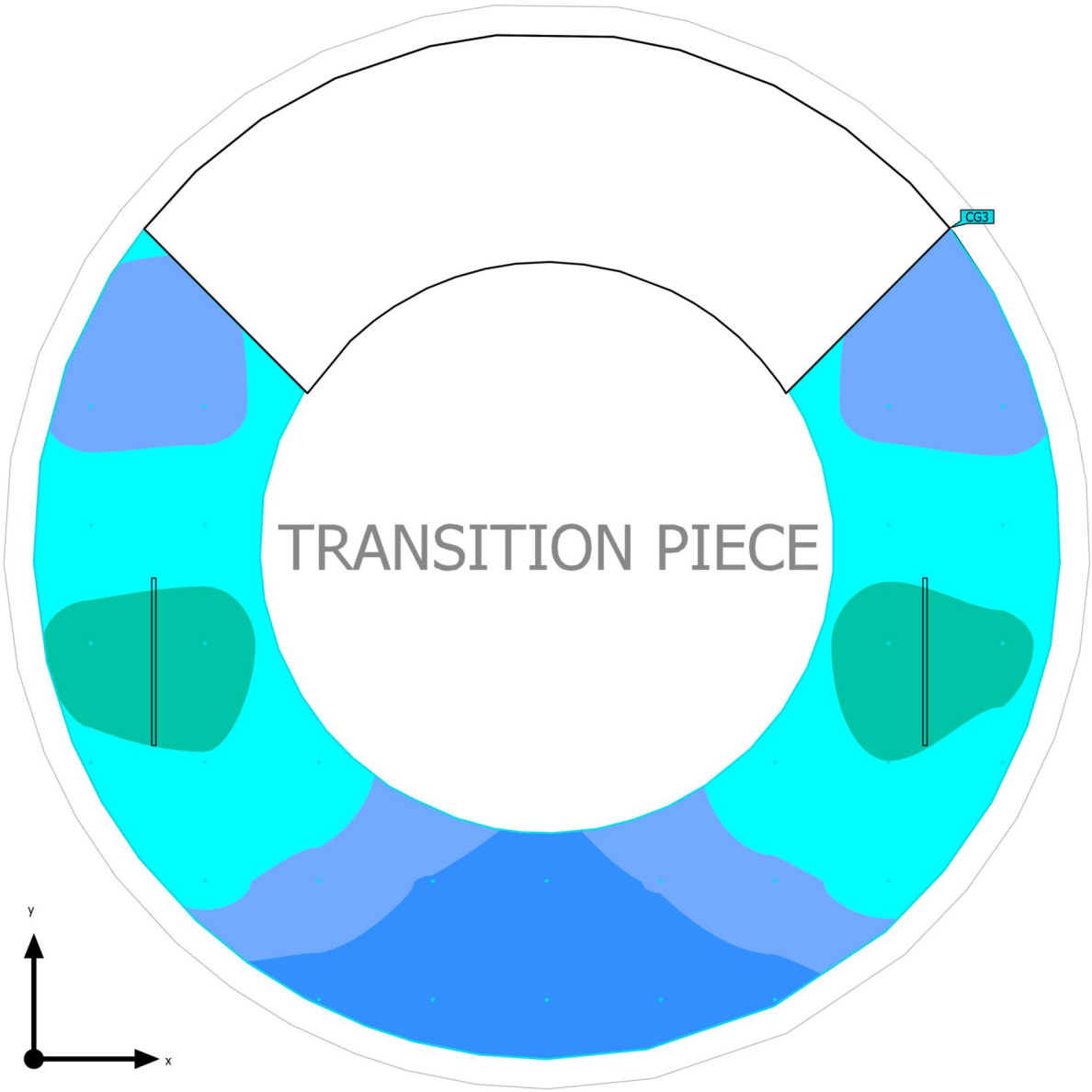
Luminaire list

Φ_{total}	P_{total}	Luminous efficacy	$\Phi_{Emergency\ lighting}$	$P_{Emergency\ lighting}$
12400 lm	120.0 W	103.3 lm/W	2336 lm	22.6 W

pcs.	Manufacturer	Article No.	Article name		P	Φ	Luminous efficacy
2	Cortem	LifEx-M..-1260 (40W)	LifEx-M..-1260 (40W)		60.0 W	6200 lm	103.3 lm/W
					11.3 W	1168 lm (19 %)	-

JB AREA · - · TRANSITION PIECE (Emergency light scene)

Calculation objects





JB AREA · - · TRANSITION PIECE (Emergency light scene)

Calculation objects

Calculation surfaces

Properties	$\bar{E}$	E_{min}	E_{max}	U_o (g_1)	g_2	Index
JB Area(Escape) Horizontal illuminance Height: 0.000 m	33.6 lx	11.8 lx	56.3 lx	0.35	0.21	CG3

Notes on planning:
The emergency lighting scene was calculated without reflection and without taking into account the placed furniture.