

EP KOPER

Installation : INDUSTRY

Project number : 503/17

Customer : REI

Processed by : ZUMTOBEL

Date : 18.12.2017

The following values are based on exact calculations on calibrated lamps, luminaires and their arrangement. In practice, gradual divergences can occur.

Guarantee claims for luminaire data are excluded.

Relux and the luminaire manufacturers accept no liability for consequential damage and damage which is occasioned to the user or to third parties.

Object : EP KOPER
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1 Luminaire data

1.1 Zumtobel, CRAFT S LED7500-840 PM WB LDO W... (42183262)

1.1.1 Data sheet

Manufacturer: Zumtobel

42183262 surface mounted CRAFT S LED7500-840 PM WB LDO WH [STD]

LED high-bay luminaire total power: 58 W, includes DALI- and emergency supply-compatible LED converter, die-cast aluminium housing in matt, white. Powder-coated cooling ribs for optimum thermal management and minimal dust accumulation. Cover of transparent polymethylmethacrylate (PM) and additional glass cover (safety glass) for challenging industrial applications. Slave luminaire for DALI control (DALI only) with LED converter. LED service life lasts 50000 h before luminous flux is reduced to 85% of the initial value over the entire ambient temperature range. Chromaticity tolerance (initial MacAdam): 4. Luminaire luminous flux: 7500 lm, Luminaire efficacy: 129 lm/W. Colour rendering Ra > 80, colour temperature 4000 K. Sealed, high-efficiency optical lens system, Luminaire with symmetric wide light distribution (wide beam) square, UGR <22. Pre-assembled 5 x 1mm² connecting cable, length 1.5m, with free ends, included in scope of supply (suspension with at least 65 mm distance to ceiling); Luminaire wired with halogen-free leads and contains no silicone. Please note: please talk to your adviser if you planning to use the luminaire in environments containing chemical pollutants. Class of protection: SC1; degree of protection: IP65; ambient temperature: -25°C to +45°C; Dimensions: 339 x 165 x 100 mm. Weight: 2.82 kg.

Luminaire data

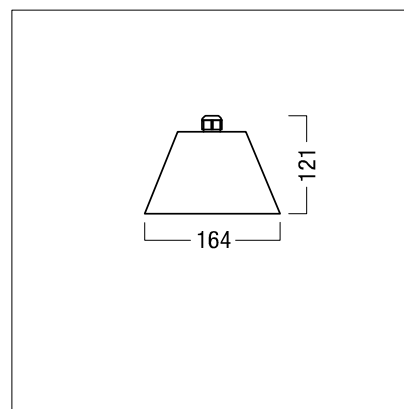
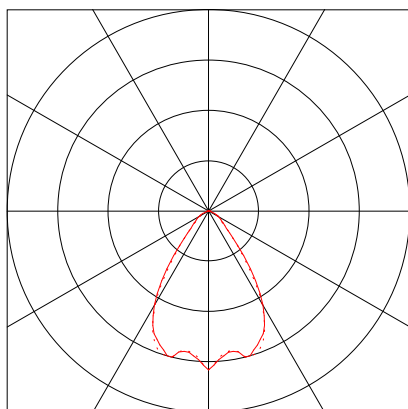
Absolute Photometry

Luminaire efficacy : 129.31 lm/W
Classification : A60 ↓100.0% ↑0.0%
CIE Flux Codes : 77 96 100 100 100
UGR 4H 8H : 22.0 / 22.3
Power : 58 W
Luminous flux : 7500 lm

Equipped with

Quantity : 1
Designation : LED-Z42183262
Colour : Unknown
Colour reproduction : 80

Dimensions : 339 mm x 165 mm x 100 mm



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1 Luminaire data

1.2 Zumtobel, CRAFT S LED7500-840 PM NB LDO W... (42183268)

1.2.1 Data sheet

Manufacturer: Zumtobel

42183268 surface mounted CRAFT S LED7500-840 PM NB LDO WH [STD]

LED high-bay luminaire total power: 58 W, includes DALI- and emergency supply-compatible LED converter, die-cast aluminium housing in matt, white. Powder-coated cooling ribs for optimum thermal management and minimal dust accumulation. Cover of transparent polymethylmethacrylate (PM) and additional glass cover (safety glass) for challenging industrial applications. Slave luminaire for DALI control (DALI only) with LED converter. LED service life lasts 50000 h before luminous flux is reduced to 85% of the initial value over the entire ambient temperature range. Chromaticity tolerance (initial MacAdam): 4. Luminaire luminous flux: 7500 lm, Luminaire efficacy: 129 lm/W. Colour rendering Ra > 80, colour temperature 4000 K. Sealed, high-efficiency optical lens system, Luminaire with symmetric narrow light distribution (narrow beam) elliptical, UGR <22. Pre-assembled 5 x 1mm² connecting cable, length 1.5m, with free ends, included in scope of supply (suspension with at least 65 mm distance to ceiling); Luminaire wired with halogen-free leads and contains no silicone. Please note: please talk to your adviser if you planning to use the luminaire in environments containing chemical pollutants. Class of protection: SC1; degree of protection: IP65; ambient temperature: -25°C to +45°C; Dimensions: 339 x 165 x 100 mm. Weight: 2.82 kg.

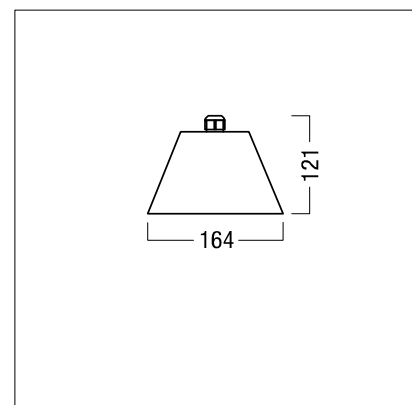
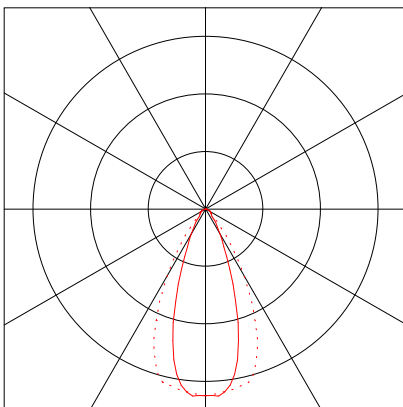
Luminaire data

Absolute Photometry
Luminaire efficacy : 129.31 lm/W
Classification : A70 ↓100.0% ↑0.0%
CIE Flux Codes : 86 96 100 100 100
UGR 4H 8H : 19.2 / 20.7
Power : 58 W
Luminous flux : 7500 lm

Equipped with

Quantity : 1
Designation : LED-Z42183262
Colour : Unknown
Colour reproduction : 80

Dimensions : 339 mm x 165 mm x 100 mm



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1 Luminaire data

1.3 Thorn, CETUS LED 1000 HF 840 [STD] (96242096)

1.3.1 Data sheet

Manufacturer: Thorn

96242096 ceiling recessed CETUS LED 1000 HF 840 [STD]

A value performance, low height, ceiling recessed LED downlight. Electronic, fixed output control gear. Body and reflector: aluminium, powder coated white (RAL 9016). Diffuser: polycarbonate. Class II electrical, IP44, IK09. Spring clips suitable for ceiling thicknesses from 1 to 35mm. Cut-out Ø190mm. Complete with 4000K LED.

Dimensions: Ø215 x 88 mm

Total power: 9.4 W

Weight: 0.7 kg

Luminaire data

Absolute Photometry

Luminaire efficacy : 111.7 lm/W

Classification : A50 ↓100.0% ↑0.0%

CIE Flux Codes : 61 90 98 100 100

UGR 4H 8H : 21.7 / 21.7

Power : 9.4 W

Luminous flux : 1050 lm

Equipped with

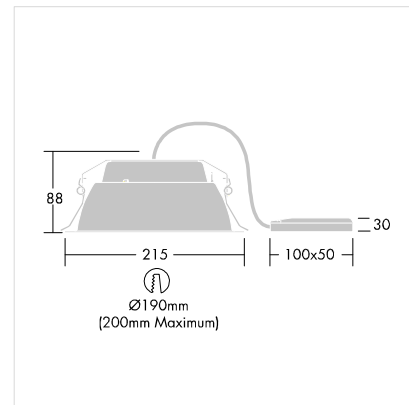
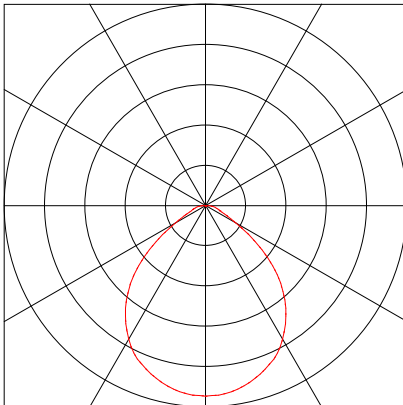
Quantity : 1

Designation :

Colour : 4000

Colour reproduction : 80

Dimensions : Ø190 mm x 3 mm



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1 Luminaire data

1.4 Thorn, CETUS LED 2000 HF 840 [STD] (96242098)

1.4.1 Data sheet

Manufacturer: Thorn

96242098 ceiling recessed CETUS LED 2000 HF 840 [STD]

A value performance, low height, ceiling recessed LED downlight. Electronic, fixed output control gear. Body and reflector: aluminium, powder coated white (RAL 9016). Diffuser: polycarbonate. Class II electrical, IP44, IK09. Spring clips suitable for ceiling thicknesses from 1 to 35mm. Cut-out Ø190mm. Complete with 4000K LED.

Dimensions: Ø215 x 88 mm

Total power: 19.5 W

Weight: 0.7 kg

Luminaire data

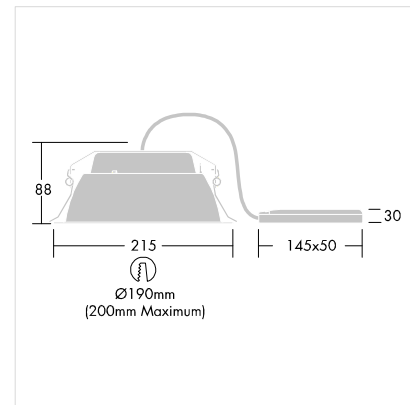
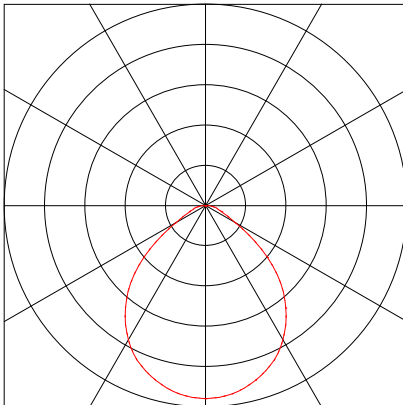
Absolute Photometry
Luminaire efficacy : 100 lm/W
Classification : A50 ↓100.0% ↑0.0%
CIE Flux Codes : 61 90 98 100 100
UGR 4H 8H : 23.7 / 23.7
Power : 19.5 W
Luminous flux : 1950 lm

Equipped with

Quantity : 1
Designation :

Colour : 4000
Colour reproduction : 80

Dimensions : Ø190 mm x 3 mm



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1 Luminaire data

1.5 Thorn, OMEGA LED 4000-840 HF Q597 [STD] (96629745)

1.5.1 Data sheet

Manufacturer: Thorn

96629745 ceiling recessed OMEGA LED 4000-840 HF Q597 [STD]

A recessed/surface/suspended LED luminaire with a slim 12mm profile. Electronic, fixed output control gear. Class II electrical, IP44 from below, IP44_IP20 from above, IK02. Body: sheet steel, white (RAL9016). Diffuser: UV-stabilized opal acrylic. Electrical connection via push wire terminal blocks, loop in/loop out possible. Complete with 4000K LED

Dimensions: 597 x 597 x 12 mm

Total power: 36.5 W

Luminaire luminous flux: 4000 lm

Luminaire efficacy: 110 lm/W

Weight: 5.1 kg

Luminaire data

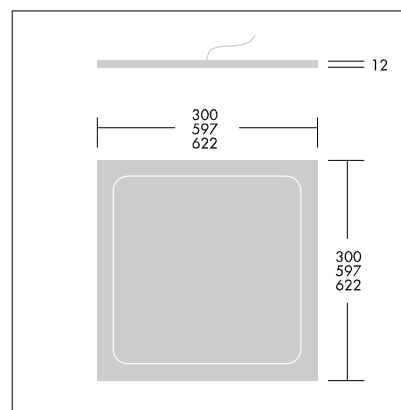
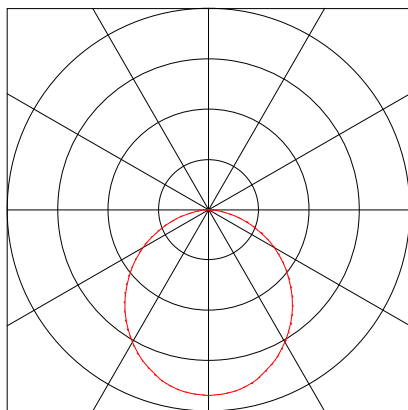
Absolute Photometry

Luminaire efficacy : 109.59 lm/W
Classification : A40 ↓100.0% ↑0.0%
CIE Flux Codes : 48 80 96 100 100
UGR 4H 8H : 21.1 / 21.2
Power : 36.5 W
Luminous flux : 4000 lm

Equipped with

Quantity : 1
Designation : OMGL_H40
Colour : 840
Colour reproduction : 80

Dimensions : 597 mm x 597 mm x 2 mm



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1 Luminaire data

1.6 Zumtobel, MIRL A LED3800-840 L1200 WB EVG... (42928710)

1.6.1 Data sheet

Manufacturer: Zumtobel

42928710 surface mounted MIRL A LED3800-840 L1200 WB EVG [STD]

Flat and modular LED surface-mount luminaire with lens optic. Total power: 27.8 W, with LED converter; LED service life lasts 50000 h before luminous flux is reduced to 85% of the initial value. Chromaticity tolerance (initial MacAdam): 3. Luminaire luminous flux: 3740 lm, Luminaire efficacy: 135 lm/W. Colour rendering Ra > 80, colour temperature 4000 K. Symmetric very wide distribution luminaire (wide beam). Light control via square lens optic for glare-free light distribution with ; low dirt sensitivity and simple cleaning; flat sheet steel luminaire housing with powder coated finish in white; luminaire housing with visible luminaire height of 52mm; Luminaire wired with halogen-free leads; Dimensions: 1200 x 300 x 52 mm, weight: 7 kg

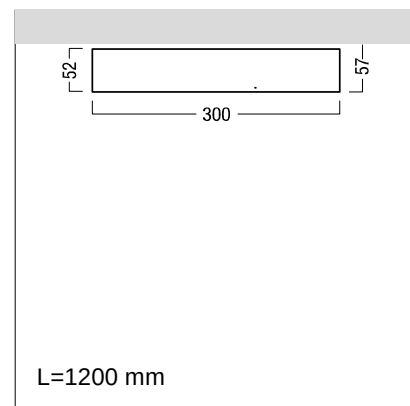
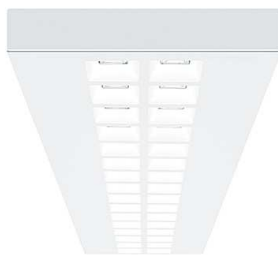
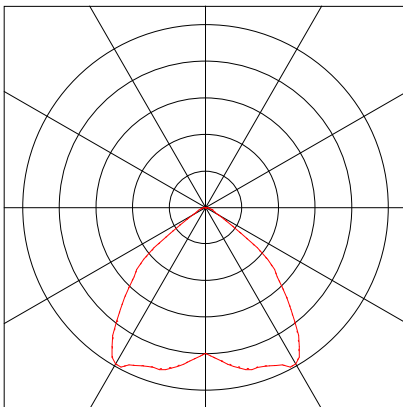
Luminaire data

Absolute Photometry
Luminaire efficacy : 134.53 lm/W
Classification : A50 ↓100.0% ↑0.0%
CIE Flux Codes : 68 95 99 100 100
UGR 4H 8H : 18.6 / 18.6
Power : 27.8 W
Luminous flux : 3740 lm

Equipped with

Quantity : 1
Designation : LED-Z42928730
Colour : Unknown
Colour reproduction : 80

Dimensions : 1200 mm x 300 mm x 52 mm



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1 Luminaire data

1.7 Thorn, AQUAF2 LED 6400 HF L840 [STD] (96241871)

1.7.1 Data sheet

Manufacturer: Thorn

96241871 surface mounted AQUAF2 LED 6400 HF L840 [STD]

An IP65, dust and moisture resistant LED luminaire. Electronic, fixed output control gear. Class I electrical. Canopy: light grey polycarbonate. Diffuser: polycarbonate with linear prisms. Toggles: stainless steel. For surface or suspended mounting. Quick-fix brackets supplied for surface mounting. Mounting kits for conduit, chain suspension and catenary suspension are available as accessories. Complete with 4000K LED.

Dimensions: 1600 x 147 x 118 mm

Total power: 53 W

Weight: 2.8 kg

Luminaire data

Absolute Photometry

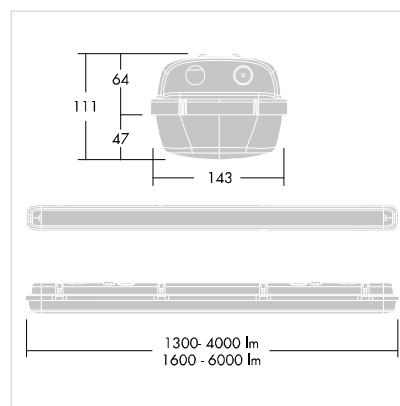
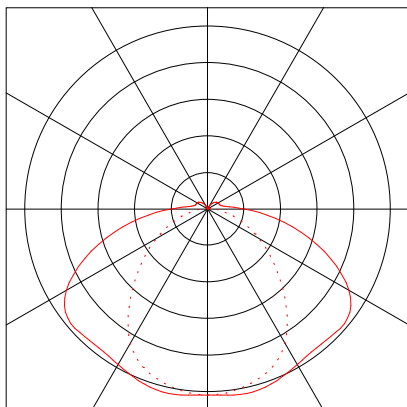
Luminaire efficacy : 120.75 lm/W
Classification : A31 ↓93.0% ↑7.0%
CIE Flux Codes : 39 69 90 93 100
UGR 4H 8H : 25.3 / 20.4
Power : 53 W
Luminous flux : 6400 lm

Equipped with

Quantity : 1
Designation :

Colour : 4000
Colour reproduction : 80

Dimensions : 1600 mm x 147 mm x 118 mm

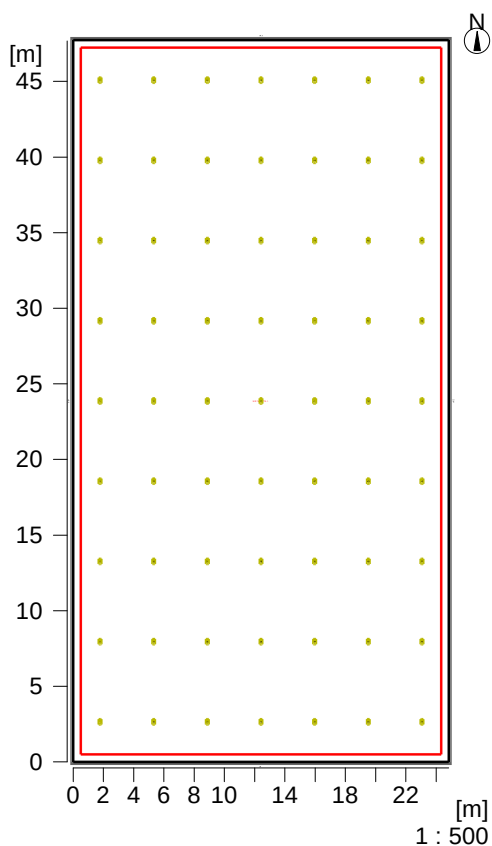


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2 Room1

2.1 Description, Room1

2.1.1 Floor plan



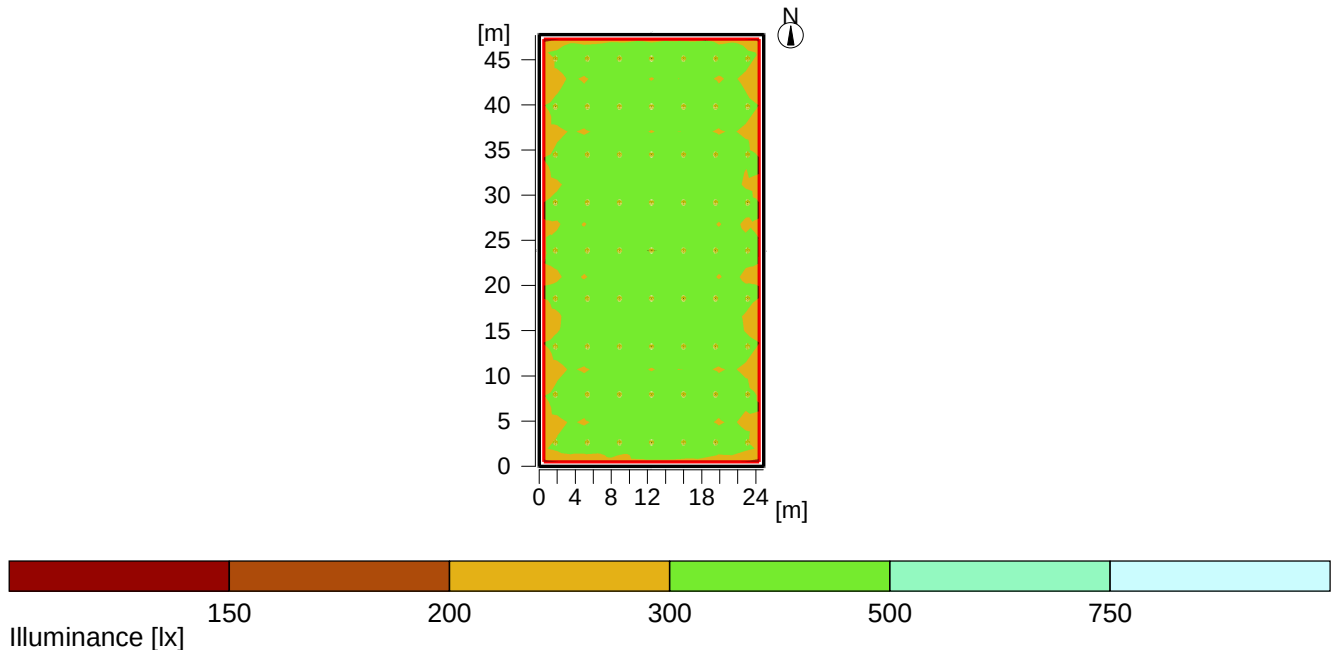
Wall	x	y	Length	Reflectance
1	24.83 m	0.00 m	24.83 m	50.0 %
2	24.83 m	47.68 m	47.68 m	50.0 %
3	-0.00 m	47.68 m	24.83 m	50.0 %
4	0.00 m	0.00 m	47.68 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		4.60 m		
Height of reference plane		0.75 m		

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2 Room1

2.2 Summary, Room1

2.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	4.60 m
Maintenance factor	0.80
Total luminous flux of all lamps	472500 lm
Total power	3654.0 W
Total power per area (1183.89 m²)	3.09 W/m² (0.90 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

	Horizontal
Em	341 lx
Emin	228 lx
Emin/Eav (Uo)	0.67
Emin/Emax (Ud)	0.52
UGR (7.6H 14.5H)	<=22.3
Position	0.75 m

Type No. \Make

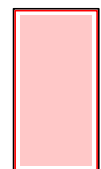
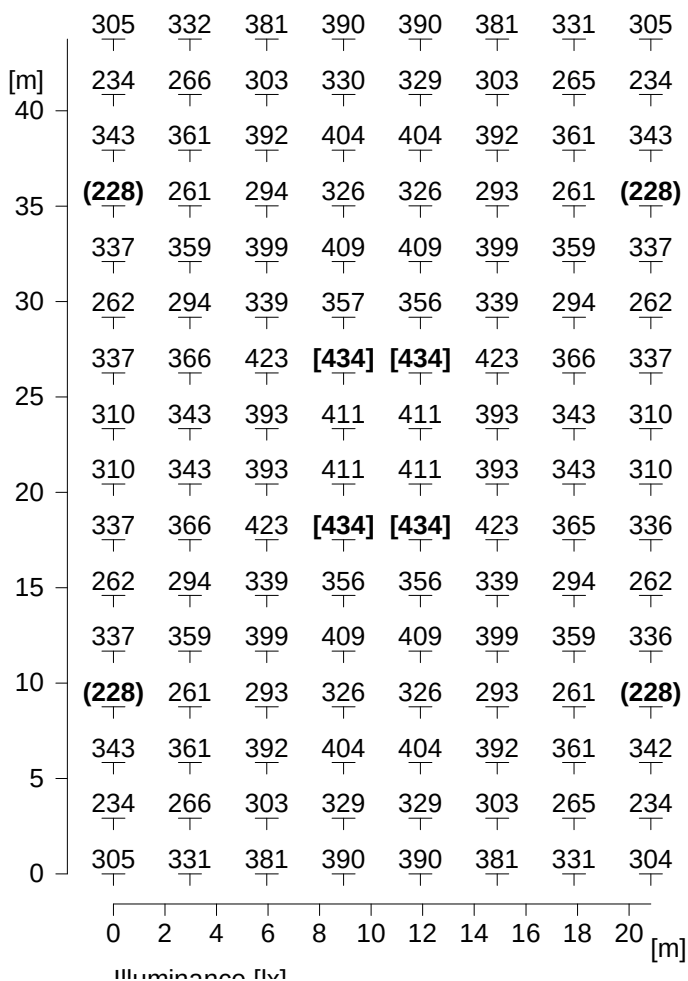
1	63	Zumtobel
		Order No. : 42183262
		Luminaire name : CRAFT S LED7500-840 PM WB LDO WH [STD]
		Equipment : 1 x LED-Z42183262 58 W / 7500 lm

Object : EP KOPER
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2 Room1

2.3 Calculation results, Room1

2.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

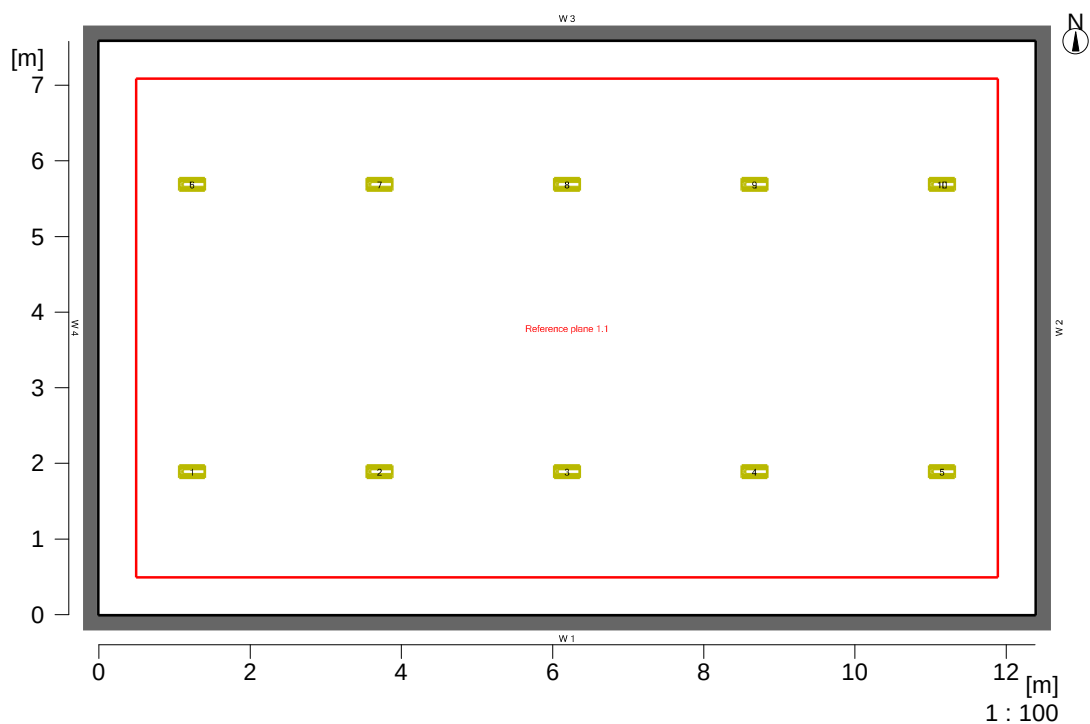
Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 341 lx
Maximum illuminance	Emax	: 228 lx
Uniformity Uo	Emin/Eav	: 434 lx
Diversity Ud	Emin/Emax	: 1 : 1.50 (0.67)
		: 1 : 1.91 (0.52)

Object : EP KOPER
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3 Room2

3.1 Description, Room2

3.1.1 Floor plan



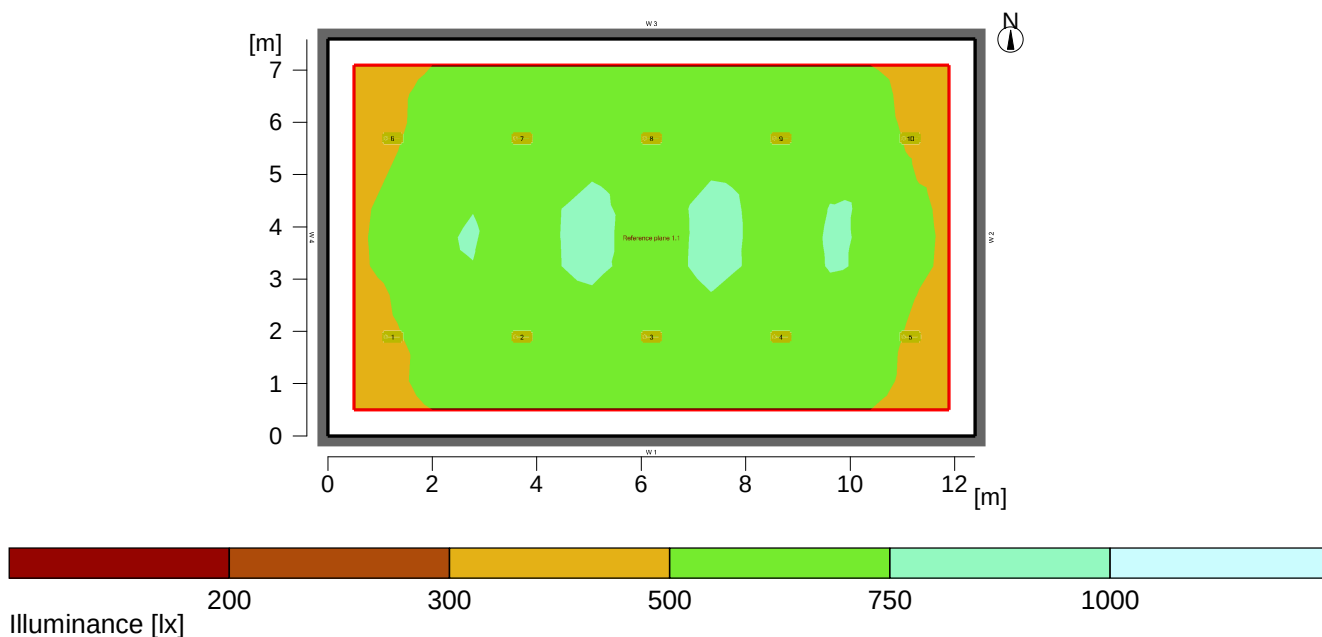
Wall	x	y	Length	Reflectance
1	12.38 m	0.00 m	12.38 m	50.0 %
2	12.38 m	7.58 m	7.58 m	50.0 %
3	-0.00 m	7.58 m	12.38 m	50.0 %
4	0.00 m	0.00 m	7.58 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		4.60 m		
Height of reference plane		0.75 m		

Object : EP KOPER
 Installation : INDUSTRY
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3 Room2

3.2 Summary, Room2

3.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used
 Height of luminaire plane
 Maintenance factor

Average indirect fraction
 4.60 m
 0.80

Total luminous flux of all lamps
 Total power
 Total power per area (93.84 m²)

75000 lm
 580.0 W
 6.18 W/m² (1.07 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

Horizontal
 Em
 Emin
 Emin/Eav (Uo)
 Emin/Emax (Ud)
 UGR (3.8H 2.3H)
 Position

579 lx
 408 lx
 0.71
 0.57
 <=22.1
 0.75 m

Type No. \Make

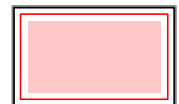
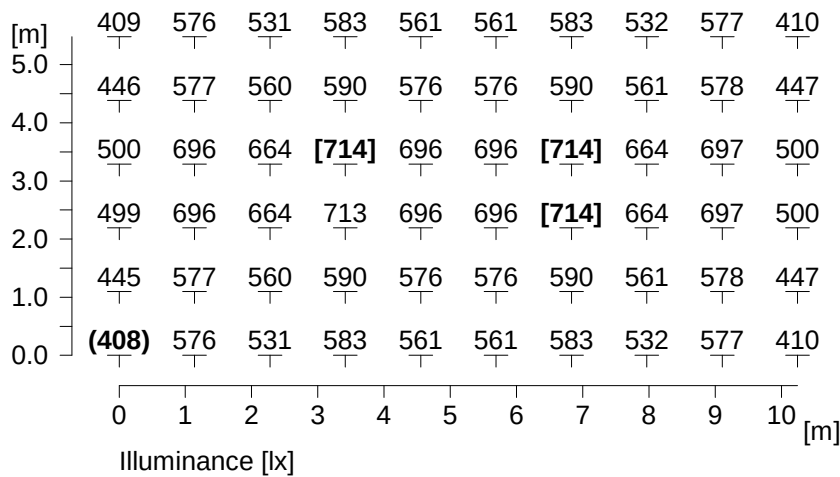
1	10	Zumtobel
		Order No. : 42183262
		Luminaire name : CRAFT S LED7500-840 PM WB LDO WH [STD]
		Equipment : 1 x LED-Z42183262 58 W / 7500 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
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3 Room2

3.3 Calculation results, Room2

3.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

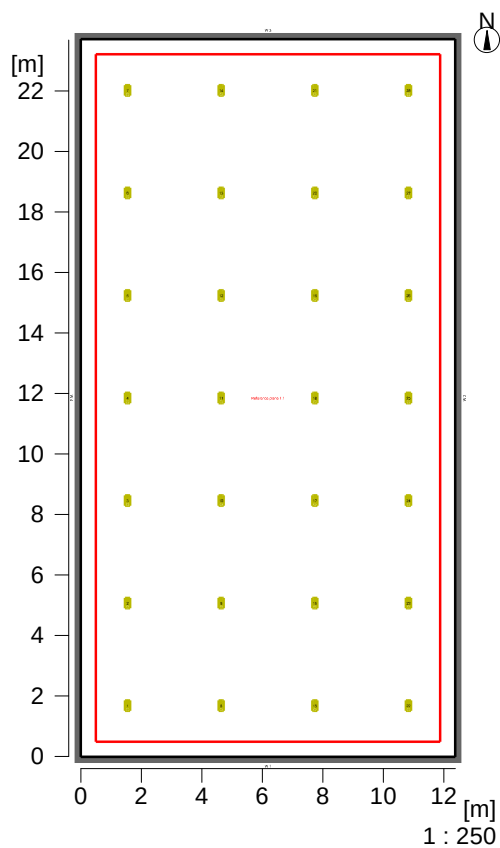
Average illuminance	Eav	: 0.75 m	: 579 lx
Minimum illuminance	Emin	: 408 lx	
Maximum illuminance	Emax	: 714 lx	
Uniformity Uo	Emin/Eav	: 1 : 1.42 (0.71)	
Diversity Ud	Emin/Emax	: 1 : 1.75 (0.57)	

Object : EP KOPER
Installation : INDUSTRY
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4 Room3

4.1 Description, Room3

4.1.1 Floor plan



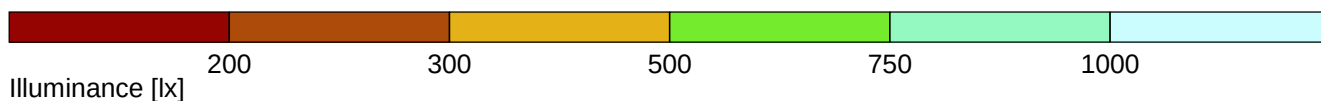
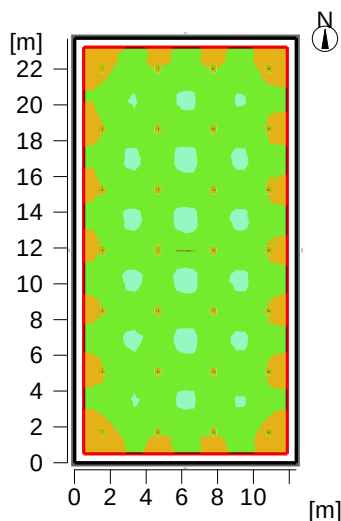
Wall	x	y	Length	Reflectance
1	12.38 m	-0.00 m	12.38 m	50.0 %
2	12.38 m	23.69 m	23.69 m	50.0 %
3	-0.00 m	23.69 m	12.38 m	50.0 %
4	0.00 m	0.00 m	23.69 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		4.60 m		
Height of reference plane		0.75 m		

Object : EP KOPER
 Installation : INDUSTRY
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 Date : 18.12.2017

4 Room3

4.2 Summary, Room3

4.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used
 Height of luminaire plane
 Maintenance factor

Average indirect fraction
 4.60 m
 0.80

Total luminous flux of all lamps
 Total power
 Total power per area (293.22 m²)

210000 lm
 1624.0 W
 5.54 W/m² (0.97 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

Horizontal
 Em 570 lx
 Emin 394 lx
 Emin/Eav (Uo) 0.69
 Emin/Emax (Ud) 0.53
 UGR (3.8H 7.2H) <=22.3
 Position 0.75 m

Type No. \ Make

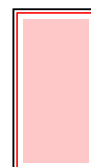
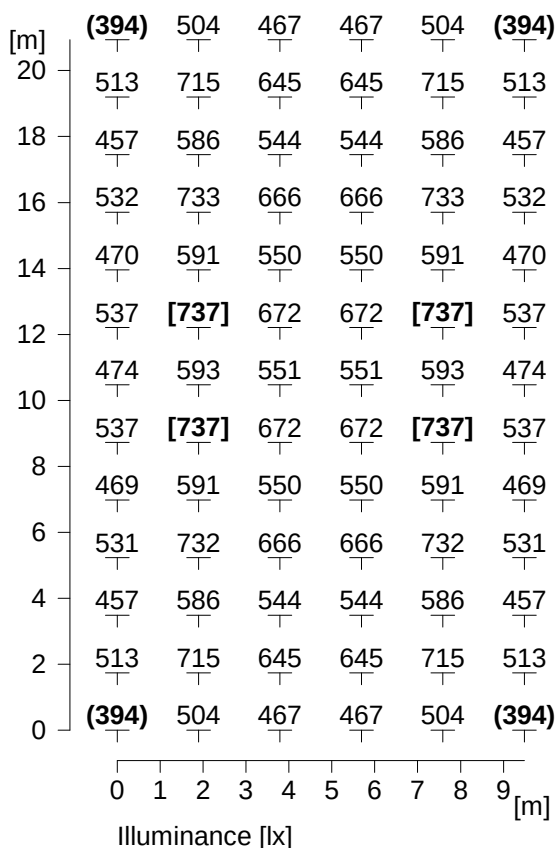
1	28	Zumtobel	
		Order No.	: 42183262
		Luminaire name	: CRAFT S LED7500-840 PM WB LDO WH [STD]
		Equipment	: 1 x LED-Z42183262 58 W / 7500 lm

Object : EP KOPER
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4 Room3

4.3 Calculation results, Room3

4.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

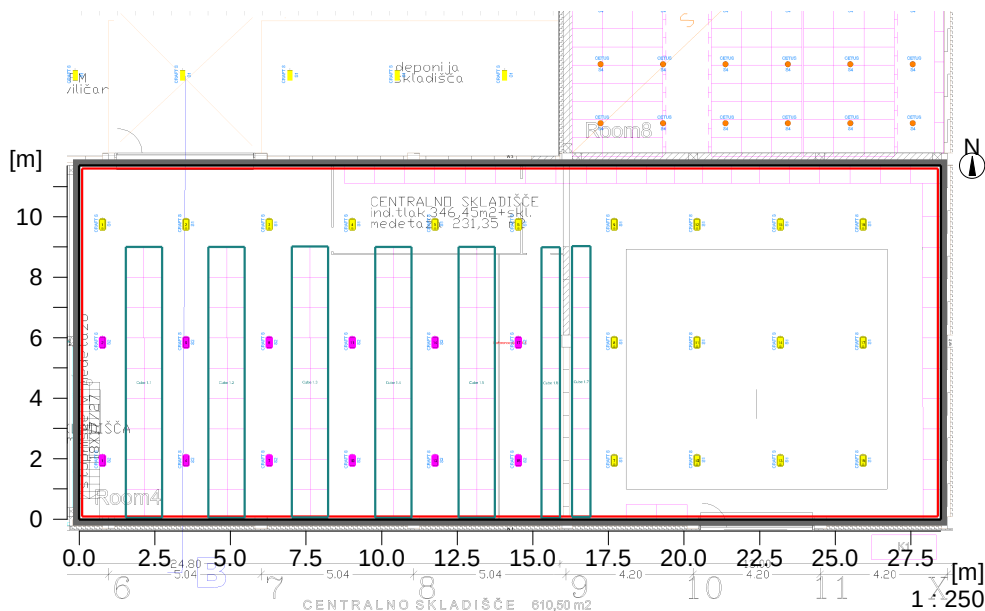
Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 570 lx
Maximum illuminance	Emax	: 394 lx
Uniformity Uo	Emin/Eav	: 737 lx
Diversity Ud	Emin/Emax	: 1 : 1.45 (0.69)
		: 1 : 1.87 (0.53)

Object : EP KOPER
 Installation : INDUSTRY
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5 Room4

5.1 Description, Room4

5.1.1 Floor plan



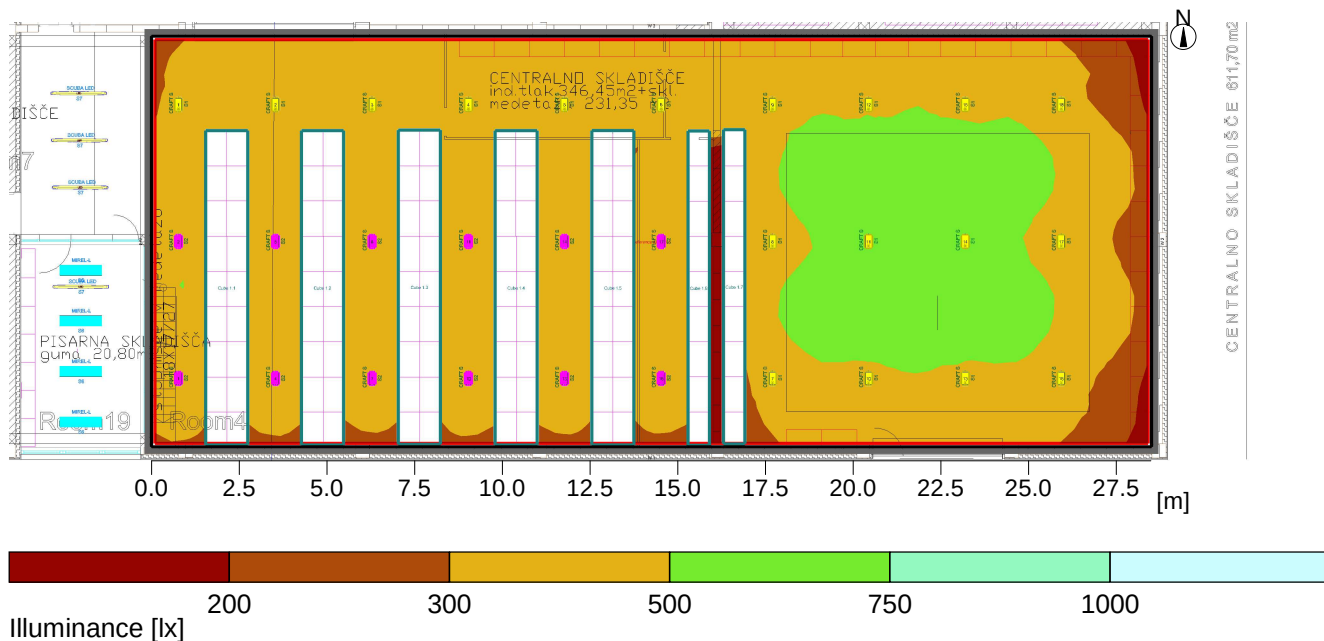
Wall	x	y	Length	Reflectance
1	28.49 m	0.00 m	28.49 m	50.0 %
2	28.49 m	11.68 m	11.68 m	50.0 %
3	-0.00 m	11.68 m	28.49 m	50.0 %
4	0.00 m	0.00 m	11.68 m	50.0 %
Floor				20.0 %
Ceiling				50.0 %
Room height		4.60 m		
Height of reference plane		0.03 m		

Object : EP KOPER
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5 Room4

5.2 Summary, Room4

5.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used
 Height of luminaire plane
 Maintenance factor

Average indirect fraction
 4.60 m
 0.80

Total luminous flux of all lamps
 Total power
 Total power per area (332.73 m²)

225000 lm
 1740.0 W
 5.23 W/m² (1.26 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

Horizontal
 Em
 Emin
 Emin/Eav (Uo)
 Emin/Emax (Ud)
 Position

415 lx
 202 lx
 0.49
 0.32
 0.03 m

Type No. Make

1 18 Zumtobel
 Order No. : 42183262
 Luminaire name : CRAFT S LED7500-840 PM WB LDO WH [STD]
 Equipment : 1 x LED-Z42183262 58 W / 7500 lm

Object : EP KOPER
Installation : INDUSTRY
Project number : 503/17
Date : 18.12.2017

zumtobel group

5 Room4

5.2 Summary, Room4

5.2.1 Result overview, Evaluation area 1

2	12	Order No.	: 42183268
		Luminaire name	: CRAFT S LED7500-840 PM NB LDO WH [STD]
		Equipment	: 1 x LED-Z42183262 58 W / 7500 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

5 Room4

5.3 Calculation results, Room4

5.3.1 Table, Reference plane 1.1 (E)

[m]	295	391	395	385	405	388	389	397	389	409	385	402	387	355	383	379	390	440	414	438	426	410	431	336	277	(202)
10	319	379	390	390	397	392	394	394	392	397	395	390	382	372	372	389	417	454	451	452	447	443	431	370	282	217
9	339		354	327		344		350	328		341			333		398	464	567	530	571	559	531	566	439	356	272
8	400		340	372		378		336	375		380			376		370	494	[630]	593	629	619	594	619	479	392	302
7	463		395	437		436		382	437		440			436		329	436	514	505	535	526	507	520	415	338	262
6	460		401	447		446		396	447		451			454		326	423	512	506	531	528	508	514	418	334	263
5	451		368	421		424		364	428		427			427		376	494	617	589	629	618	593	616	479	396	301
4	457		380	419		429		368	428		432			427		336	449	547	526	567	555	529	558	436	353	270
3	443		367	404		407		359	411		411			409		277	370	439	445	452	446	441	436	368	291	218
2	363		293	324		316		278	326		324			321		246	341	418	402	432	423	403	427	329	267	204
1																										
0																										
	0.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	[m]														
	Illuminance [lx]																									



Height of the reference plane

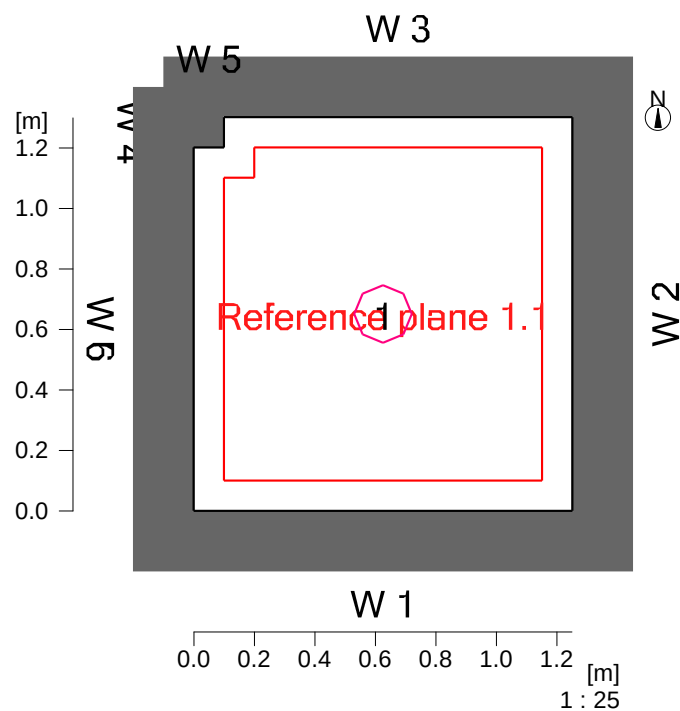
	: 0.03 m
Average illuminance	Eav : 415 lx
Minimum illuminance	Emin : 202 lx
Maximum illuminance	Emax : 630 lx
Uniformity Uo	Emin/Eav : 1 : 2.06 (0.49)
Diversity Ud	Emin/Emax : 1 : 3.12 (0.32)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

6 Room5

6.1 Description, Room5

6.1.1 Floor plan



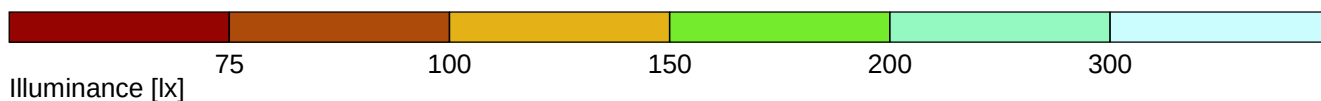
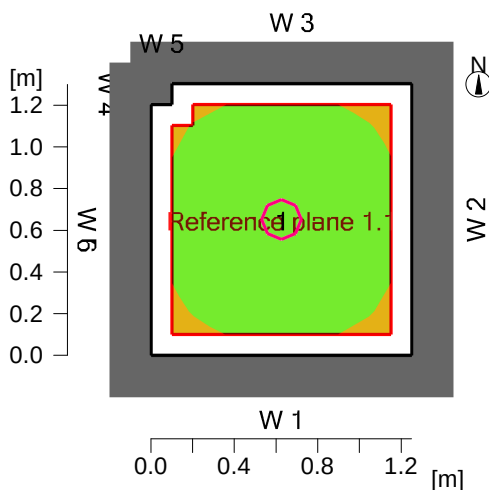
Wall	x	y	Length	Reflectance
1	1.25 m	0.00 m	1.25 m	50.0 %
2	1.25 m	1.30 m	1.30 m	50.0 %
3	0.10 m	1.30 m	1.15 m	50.0 %
4	0.10 m	1.20 m	0.10 m	50.0 %
5	0.00 m	1.20 m	0.10 m	50.0 %
6	0.00 m	0.00 m	1.20 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.03 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

6 Room5

6.2 Summary, Room5

6.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.70 m
Maintenance factor	0.80
Total luminous flux of all lamps	1950 lm
Total power	19.5 W
Total power per area (1.62 m²)	12.07 W/m² (7.78 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

	Horizontal
Em	155 lx
Emin	144 lx
Emin/Eav (Uo)	0.93
Emin/Emax (Ud)	0.86
UGR (2.0H 2.0H)	<=22.1
Position	0.03 m

Type No. \ Make

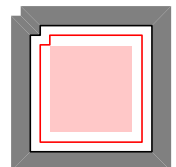
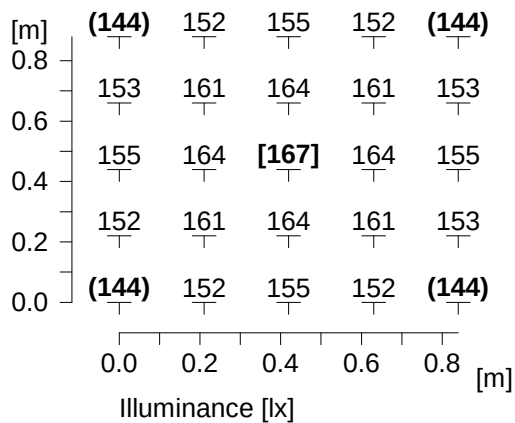
4	1	Thorn
		Order No. : 96242098
		Luminaire name : CETUS LED 2000 HF 840 [STD]
		Equipment : 1 x CTUL_2000_840 20 W / 1950 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

6 Room5

6.3 Calculation results, Room5

6.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

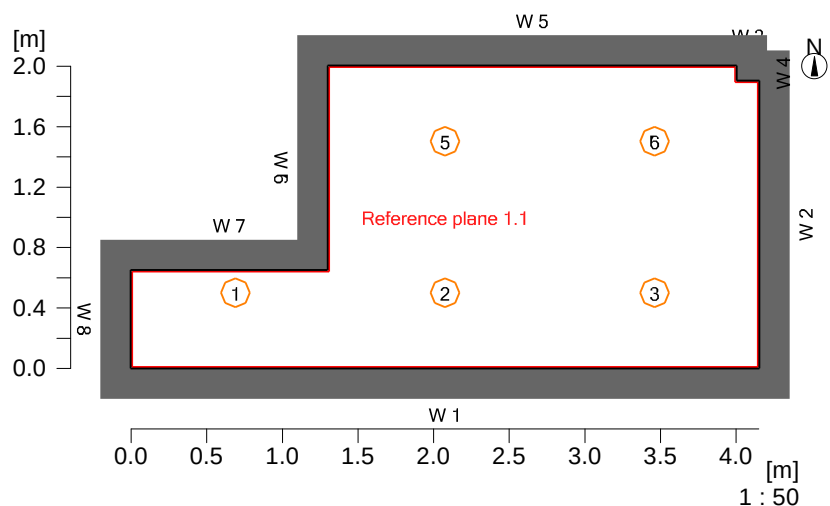
		: 0.03 m
Average illuminance	Eav	: 155 lx
Minimum illuminance	Emin	: 144 lx
Maximum illuminance	Emax	: 167 lx
Uniformity Uo	Emin/Eav	: 1 : 1.08 (0.93)
Diversity Ud	Emin/Emax	: 1 : 1.16 (0.86)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

7 Room6

7.1 Description, Room6

7.1.1 Floor plan



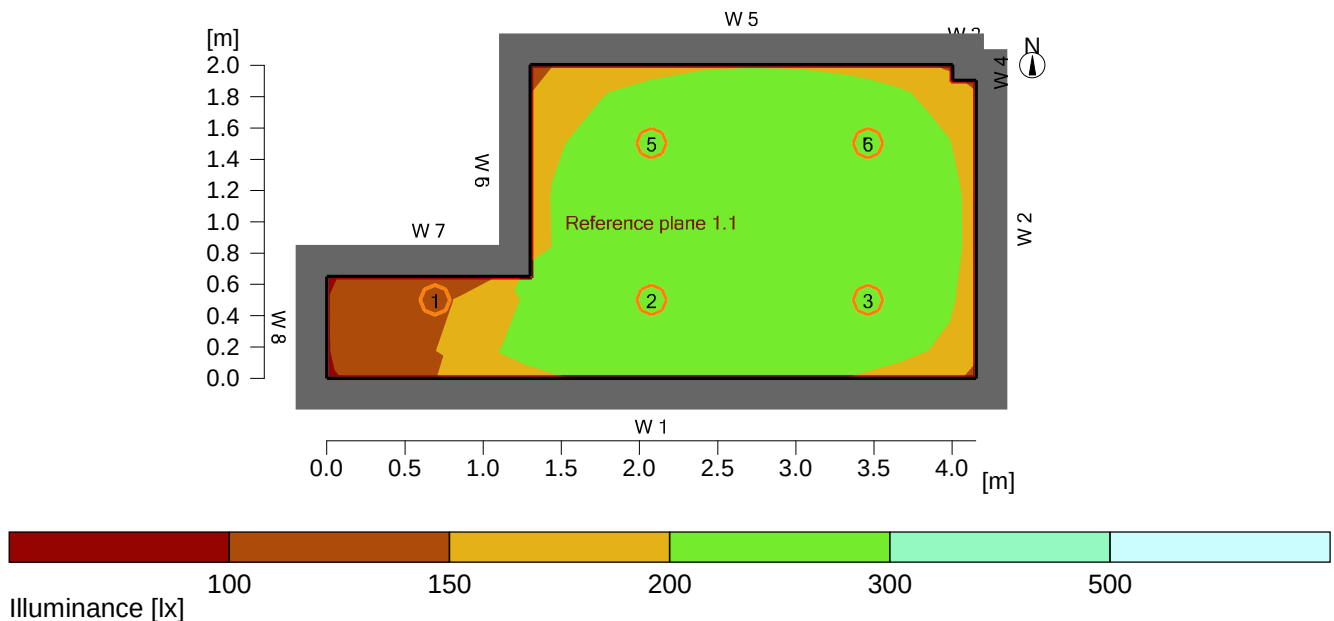
Wall	x	y	Length	Reflectance
1	4.15 m	0.00 m	4.15 m	50.0 %
2	4.15 m	1.90 m	1.90 m	50.0 %
3	4.00 m	1.90 m	0.15 m	50.0 %
4	4.00 m	2.00 m	0.10 m	50.0 %
5	1.30 m	2.00 m	2.70 m	50.0 %
6	1.30 m	0.65 m	1.35 m	50.0 %
7	0.00 m	0.65 m	1.30 m	50.0 %
8	0.00 m	0.00 m	0.65 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.03 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

7 Room6

7.2 Summary, Room6

7.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.70 m
Maintenance factor	0.80
Total luminous flux of all lamps	5250 lm
Total power	47.0 W
Total power per area (6.53 m ²)	7.20 W/m ² (3.35 W/m ² /100lx)

Evaluation area 1

Reference plane 1.1

Horizontal	
Em	215 lx
Emin	112 lx
Emin/Eav (Uo)	0.52
Emin/Emax (Ud)	0.41
UGR (1.3H 2.8H)	<=20.3
Position	0.03 m

Type No. \ Make

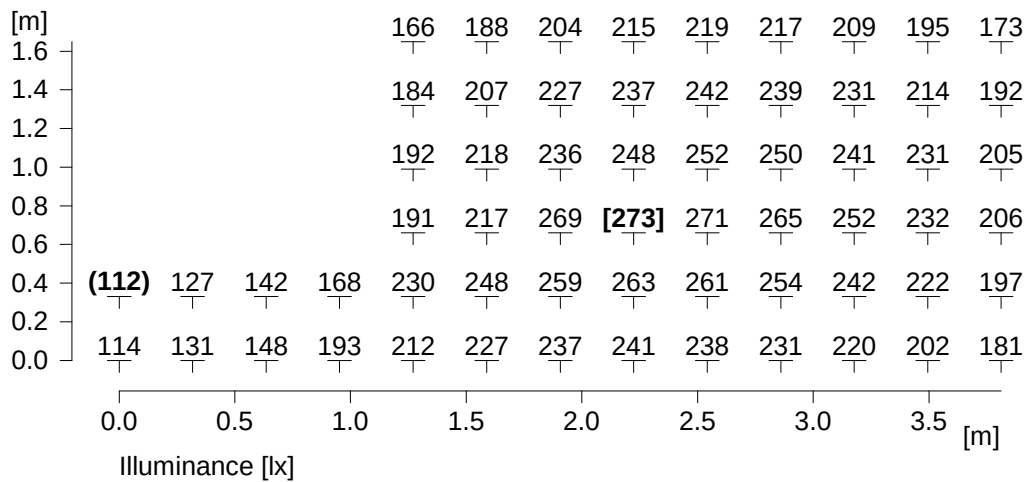
3	5	Thorn
		Order No. : 96242096
		Luminaire name : CETUS LED 1000 HF 840 [STD]
		Equipment : 1 x CTUL_1000_840 9 W / 1050 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

7 Room6

7.3 Calculation results, Room6

7.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

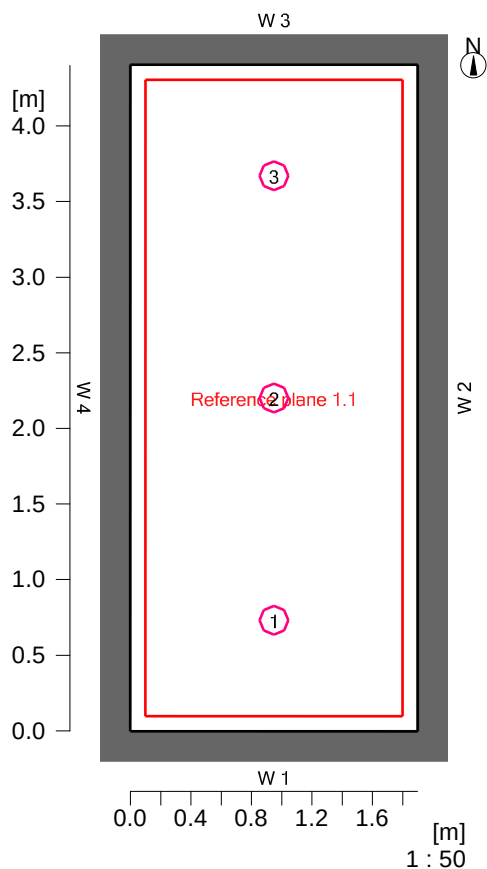
Average illuminance	Eav	: 0.03 m
Minimum illuminance	Emin	: 215 lx
Maximum illuminance	Emax	: 112 lx
Uniformity Uo	Emin/Eav	: 273 lx
Diversity Ud	Emin/Emax	: 1 : 1.92 (0.52)
		: 1 : 2.44 (0.41)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

8 Room7

8.1 Description, Room7

8.1.1 Floor plan



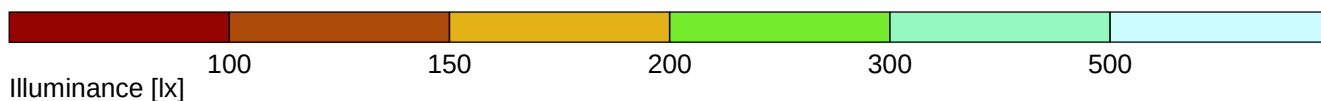
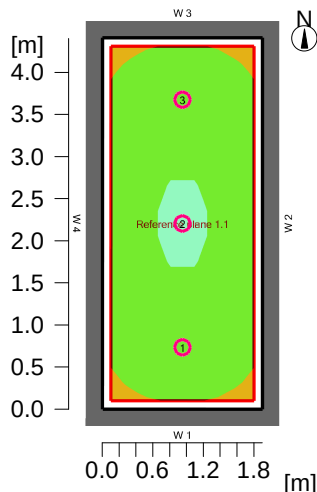
Wall	x	y	Length	Reflectance
1	1.90 m	-0.00 m	1.90 m	50.0 %
2	1.90 m	4.40 m	4.40 m	50.0 %
3	0.00 m	4.40 m	1.90 m	50.0 %
4	0.00 m	0.00 m	4.40 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		----		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

8 Room7

8.2 Summary, Room7

8.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.70 m
Maintenance factor	0.80
Total luminous flux of all lamps	5850 lm
Total power	58.5 W
Total power per area (8.36 m²)	7.00 W/m² (2.83 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

Horizontal	
Em	247 lx
Emin	185 lx
Emin/Eav (Uo)	0.75
Emin/Emax (Ud)	0.64
UGR (1.3H 2.9H)	<=22.5
Position	0.03 m (rot: 0°/0.01°)

Type No. \ Make

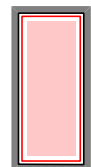
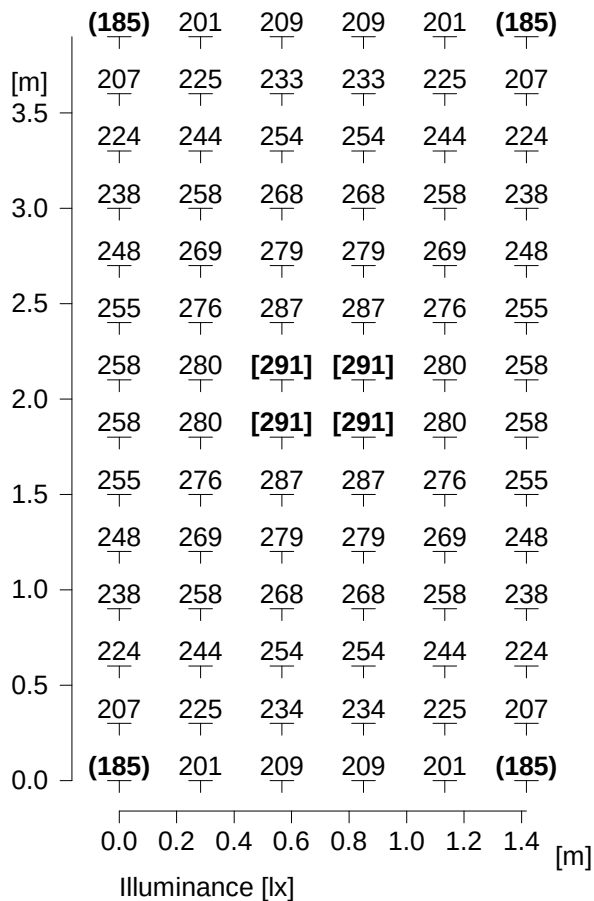
4	3	Thorn	
		Order No.	: 96242098
		Luminaire name	: CETUS LED 2000 HF 840 [STD]
		Equipment	: 1 x CTUL_2000_840 20 W / 1950 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

8 Room7

8.3 Calculation results, Room7

8.3.1 Table, Reference plane 1.1 (E)



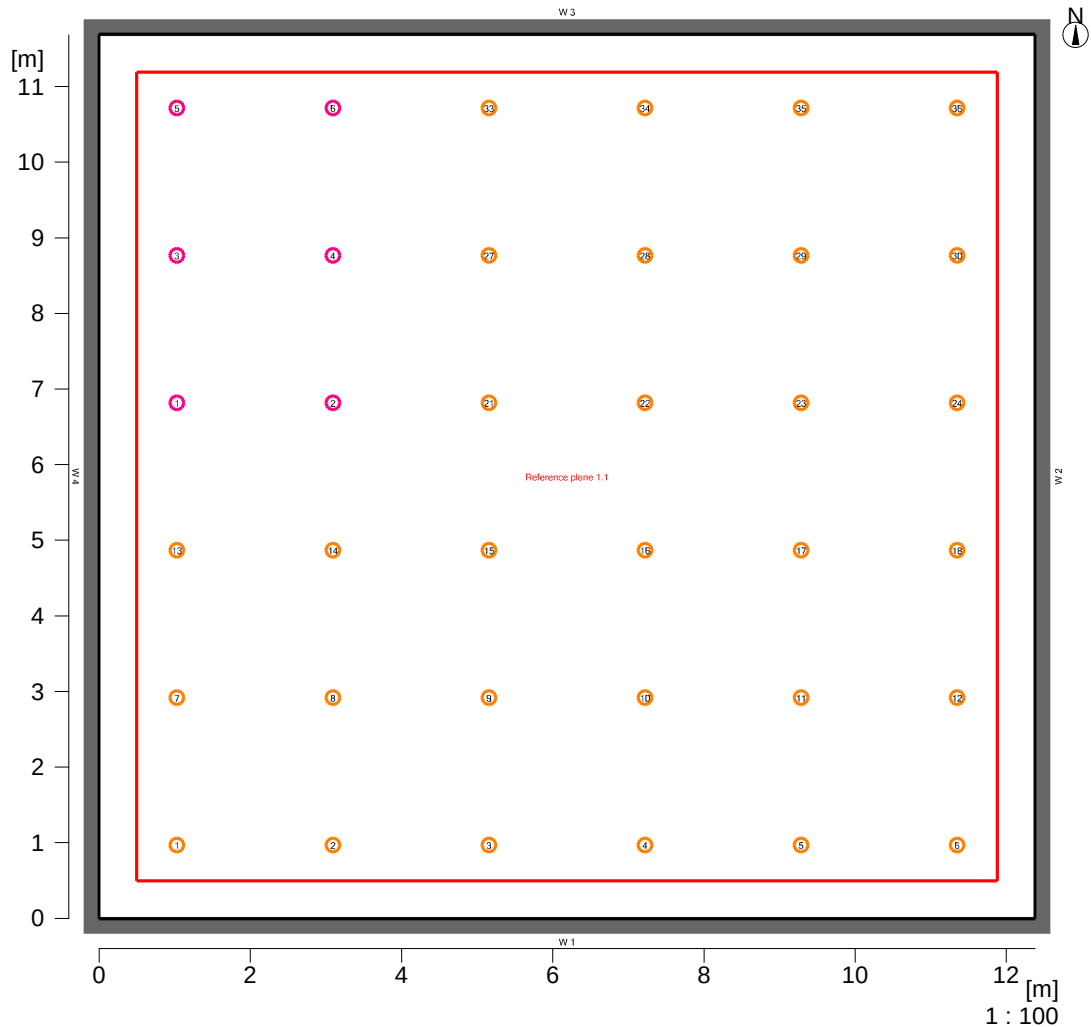
Average illuminance	Eav	: 247 lx
Minimum illuminance	Emin	: 185 lx
Maximum illuminance	Emax	: 291 lx
Uniformity Uo	Emin/Eav	: 1 : 1.33 (0.75)
Diversity Ud	Emin/Emax	: 1 : 1.57 (0.64)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

9 Room8

9.1 Description, Room8

9.1.1 Floor plan



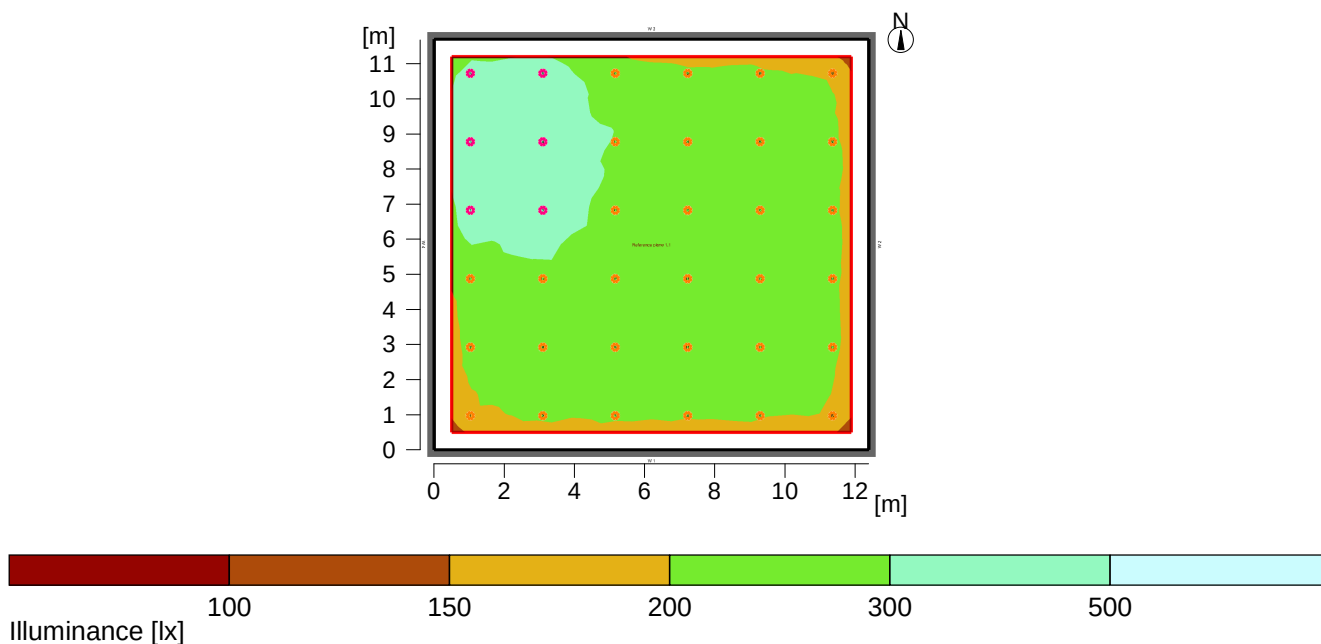
Wall	x	y	Length	Reflectance
1	12.38 m	0.00 m	12.38 m	50.0 %
2	12.38 m	11.68 m	11.68 m	50.0 %
3	0.00 m	11.68 m	12.38 m	50.0 %
4	0.00 m	0.00 m	11.68 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.75 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

9 Room8

9.2 Summary, Room8

9.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.70 m
Maintenance factor	0.80
Total luminous flux of all lamps	43200 lm
Total power	399.0 W
Total power per area (144.60 m ²)	2.76 W/m ² (1.12 W/m ² /100lx)

Evaluation area 1

Reference plane 1.1

	Horizontal
Em	246 lx
Emin	183 lx
Emin/Eav (Uo)	0.74
Emin/Emax (Ud)	0.47
Position	0.75 m

Type No. \Make

3	30	Thorn
		Order No. : 96242096
		Luminaire name : CETUS LED 1000 HF 840 [STD]
		Equipment : 1 x CTUL_1000_840 9 W / 1050 lm

Object : EP KOPER
Installation : INDUSTRY
Project number : 503/17
Date : 18.12.2017

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9 Room8

9.2 Summary, Room8

9.2.1 Result overview, Evaluation area 1

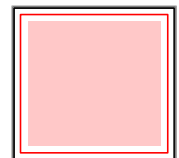
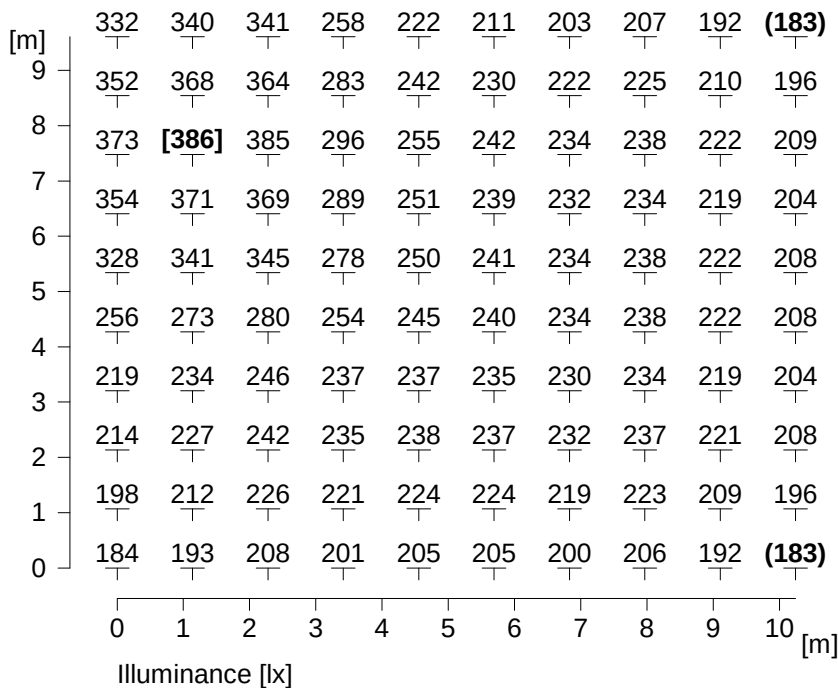
4	6	Order No.	: 96242098
		Luminaire name	: CETUS LED 2000 HF 840 [STD]
		Equipment	: 1 x CTUL_2000_840 20 W / 1950 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

9 Room8

9.3 Calculation results, Room8

9.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

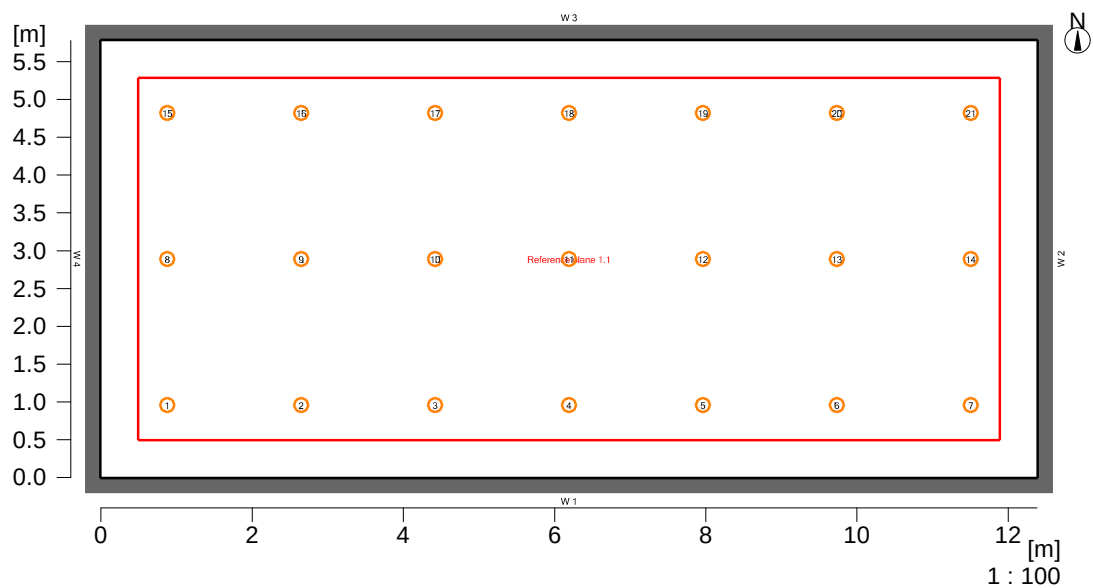
Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 246 lx
Maximum illuminance	Emax	: 183 lx
Uniformity Uo	Emin/Eav	: 386 lx
Diversity Ud	Emin/Emax	: 1 : 1.35 (0.74)
		: 1 : 2.11 (0.47)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

10 Room9

10.1 Description, Room9

10.1.1 Floor plan



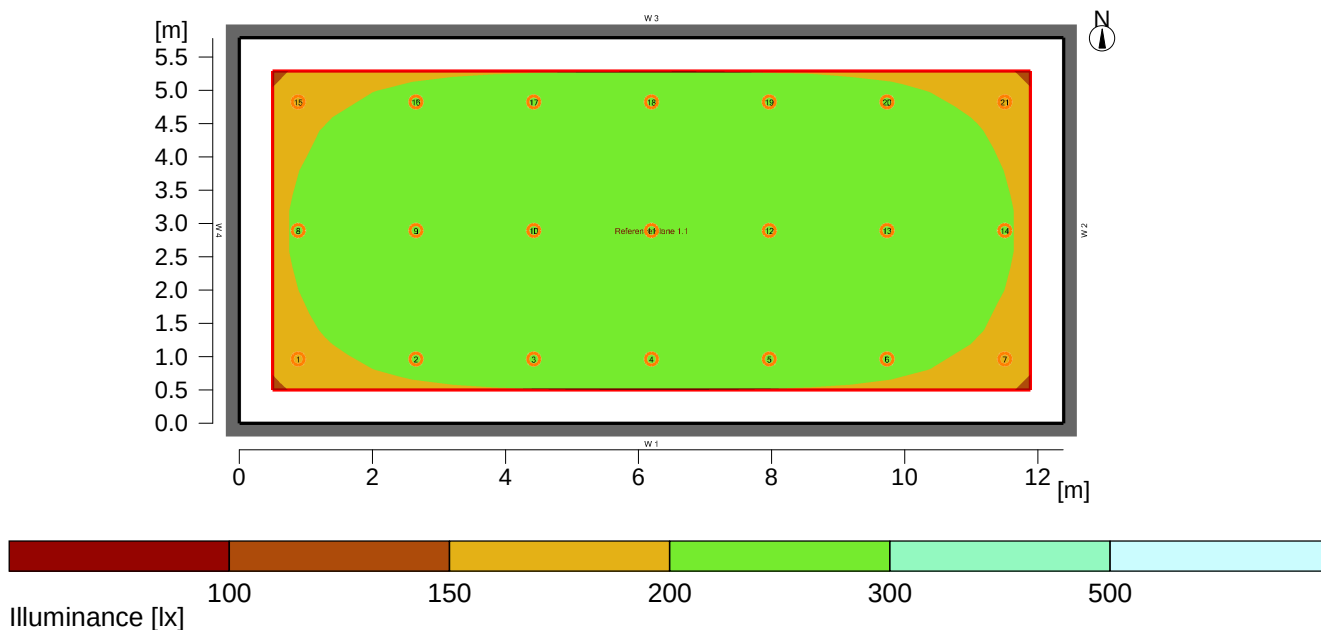
Wall	x	y	Length	Reflectance
1	12.38 m	0.00 m	12.38 m	50.0 %
2	12.38 m	5.78 m	5.78 m	50.0 %
3	0.00 m	5.78 m	12.38 m	50.0 %
4	0.00 m	0.00 m	5.78 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.03 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

10 Room9

10.2 Summary, Room9

10.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.70 m
Maintenance factor	0.80
Total luminous flux of all lamps	22050 lm
Total power	197.4 W
Total power per area (71.56 m ²)	2.76 W/m ² (1.26 W/m ² /100lx)

Evaluation area 1

Reference plane 1.1

Horizontal	
Em	219 lx
Emin	158 lx
Emin/Eav (Uo)	0.72
Emin/Emax (Ud)	0.63
UGR (3.9H 8.3H)	<=21.6
Position	0.03 m

Type No. \ Make

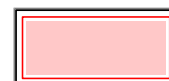
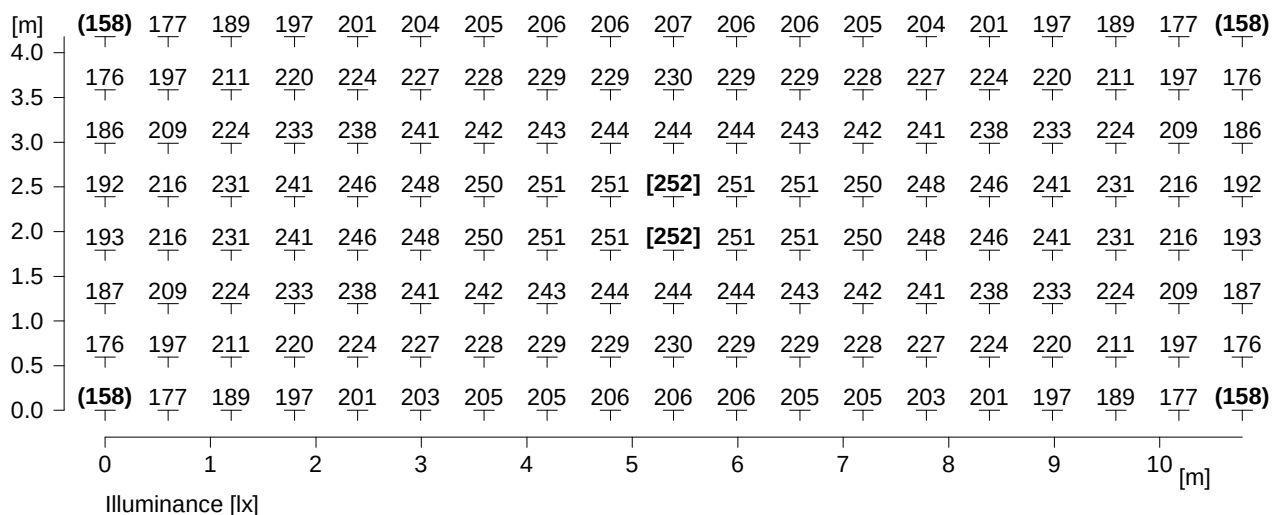
3	21	Thorn	
		Order No.	: 96242096
		Luminaire name	: CETUS LED 1000 HF 840 [STD]
		Equipment	: 1 x CTUL_1000_840 9 W / 1050 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

10 Room9

10.3 Calculation results, Room9

10.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

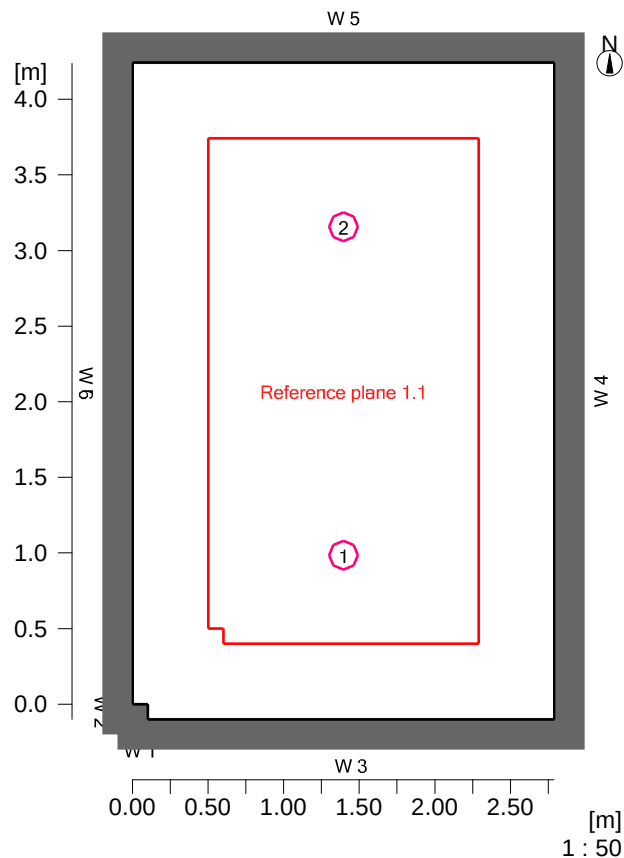
Average illuminance	Eav	: 0.03 m	: 219 lx
Minimum illuminance	Emin	: 158 lx	
Maximum illuminance	Emax	: 252 lx	
Uniformity Uo	Emin/Eav	: 1 : 1.39 (0.72)	
Diversity Ud	Emin/Emax	: 1 : 1.60 (0.63)	

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

11 Room10

11.1 Description, Room10

11.1.1 Floor plan



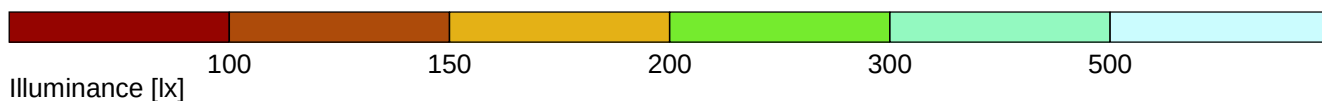
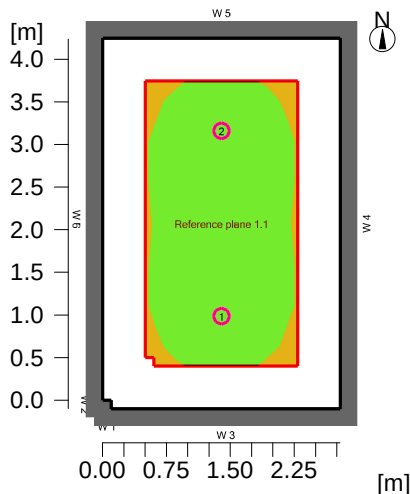
Wall	x	y	Length	Reflectance
1	0.10 m	0.00 m	0.10 m	50.0 %
2	0.10 m	-0.10 m	0.10 m	50.0 %
3	2.79 m	-0.10 m	2.69 m	50.0 %
4	2.79 m	4.24 m	4.34 m	50.0 %
5	0.00 m	4.24 m	2.79 m	50.0 %
6	0.00 m	0.00 m	4.24 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.75 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

11 Room10

11.2 Summary, Room10

11.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.70 m
Maintenance factor	0.80
Total luminous flux of all lamps	3900 lm
Total power	39.0 W
Total power per area (12.08 m²)	3.23 W/m² (1.45 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

	Horizon
Em	223 lx
Emin	191 lx
Emin/Eav (Uo)	0.86
Emin/Emax (Ud)	0.76
UGR (1.9H 2.9H)	<=22.5
Position	0.75 m

Type No. \ Make

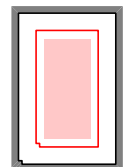
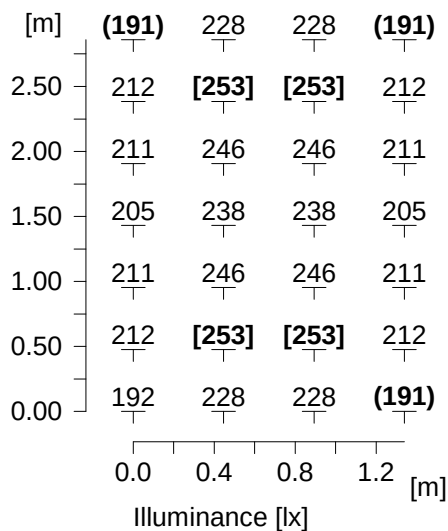
4	2	Thorn
		Order No. : 96242098
		Luminaire name : CETUS LED 2000 HF 840 [STD]
		Equipment : 1 x CTUL_2000_840 20 W / 1950 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

11 Room10

11.3 Calculation results, Room10

11.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

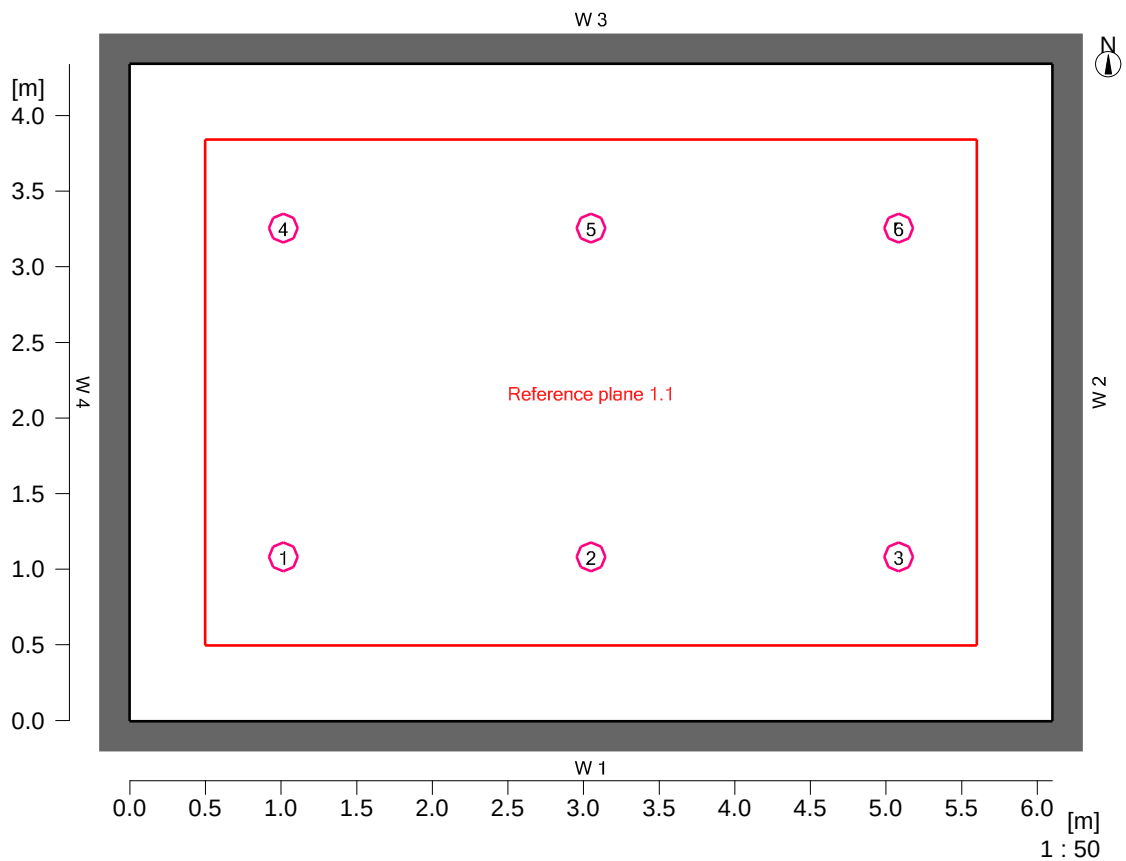
		: 0.75 m
Average illuminance	Eav	: 223 lx
Minimum illuminance	Emin	: 191 lx
Maximum illuminance	Emax	: 253 lx
Uniformity Uo	Emin/Eav	: 1 : 1.17 (0.86)
Diversity Ud	Emin/Emax	: 1 : 1.32 (0.76)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

12 Room11

12.1 Description, Room11

12.1.1 Floor plan



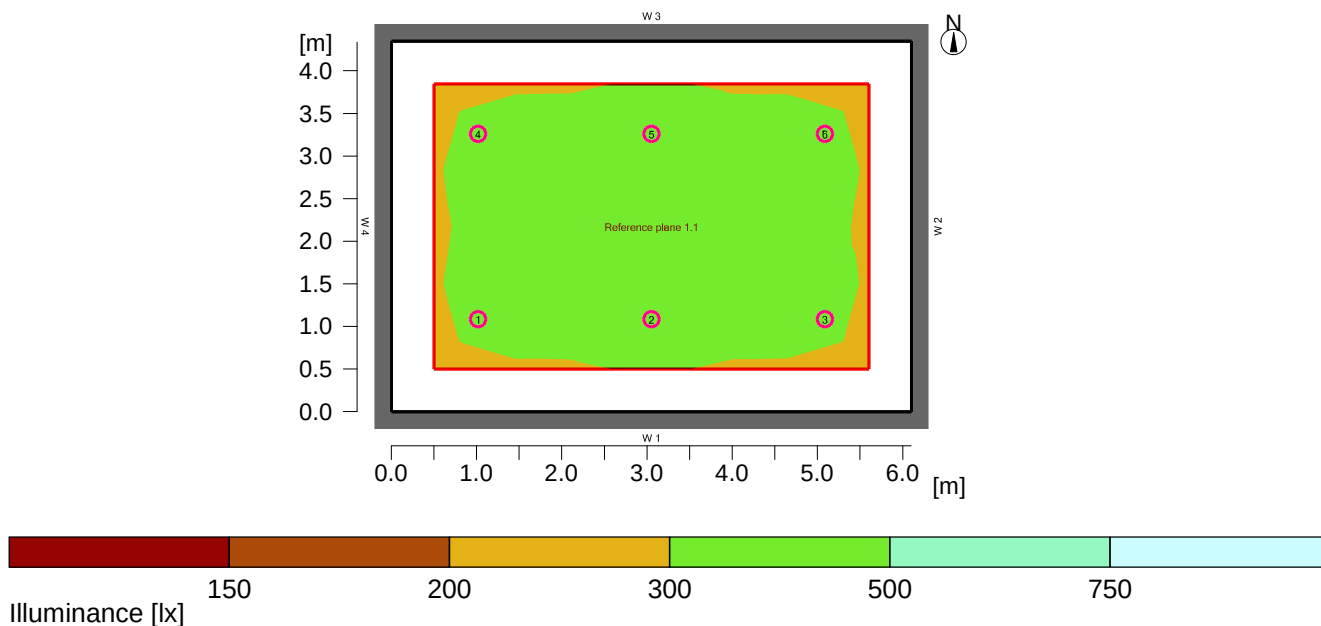
Wall	x	y	Length	Reflectance
1	6.10 m	0.00 m	6.10 m	50.0 %
2	6.10 m	4.34 m	4.34 m	50.0 %
3	0.00 m	4.34 m	6.10 m	50.0 %
4	0.00 m	0.00 m	4.34 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.75 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

12 Room11

12.2 Summary, Room11

12.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.70 m
Maintenance factor	0.80
Total luminous flux of all lamps	11700 lm
Total power	117.0 W
Total power per area (26.46 m ²)	4.42 W/m ² (1.38 W/m ² /100lx)

Evaluation area 1

Reference plane 1.1

	Horizontal
Em	321 lx
Emin	287 lx
Emin/Eav (Uo)	0.89
Emin/Emax (Ud)	0.81
UGR (2.9H 4.1H)	<=23.0
Position	0.75 m

Type No. \ Make

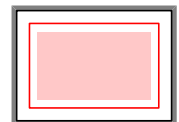
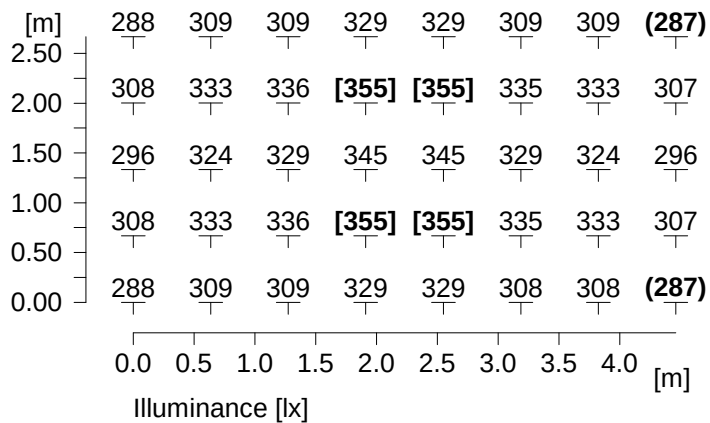
4	6	Thorn
		Order No. : 96242098
		Luminaire name : CETUS LED 2000 HF 840 [STD]
		Equipment : 1 x CTUL_2000_840 20 W / 1950 lm

Object : EP KOPER
Installation : INDUSTRY
Project number : 503/17
Date : 18.12.2017

12 Room11

12.3 Calculation results, Room11

12.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

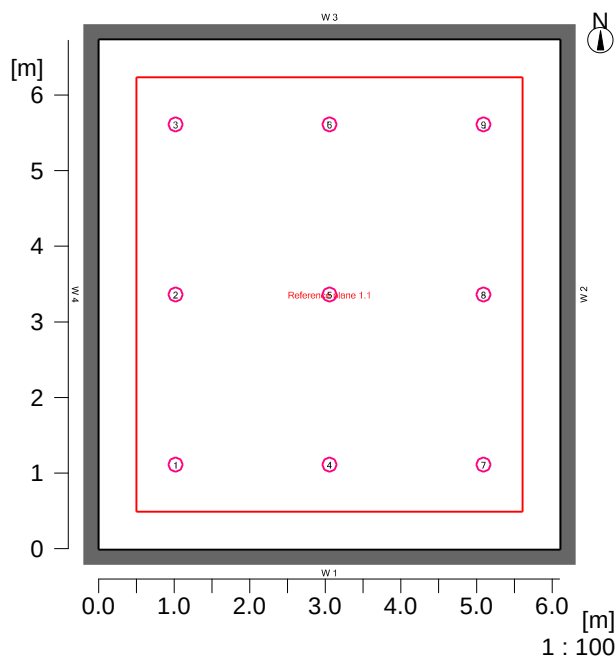
Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 321 lx
Maximum illuminance	Emax	: 287 lx
Uniformity Uo	Emin/Eav	: 355 lx
Diversity Ud	Emin/Emax	: 1 : 1.12 (0.89)
		: 1 : 1.24 (0.81)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

13 Room12

13.1 Description, Room12

13.1.1 Floor plan



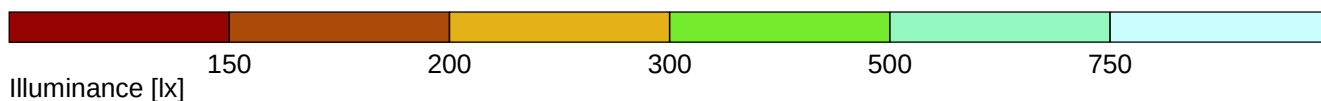
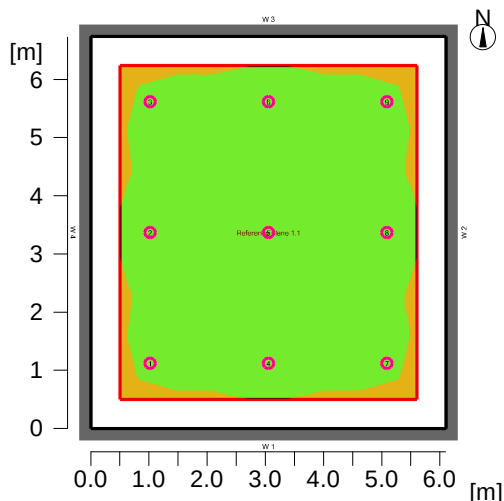
Wall	x	y	Length	Reflectance
1	6.10 m	0.00 m	6.10 m	50.0 %
2	6.10 m	6.72 m	6.72 m	50.0 %
3	0.00 m	6.72 m	6.10 m	50.0 %
4	0.00 m	0.00 m	6.72 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.75 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

13 Room12

13.2 Summary, Room12

13.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.70 m
Maintenance factor	0.80
Total luminous flux of all lamps	17550 lm
Total power	175.5 W
Total power per area (41.02 m²)	4.28 W/m² (1.30 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

Horizontal	
Em	328 lx
Emin	286 lx
Emin/Eav (Uo)	0.87
Emin/Emax (Ud)	0.77
UGR (4.1H 4.5H)	<=23.4
Position	0.75 m

Type No. \ Make

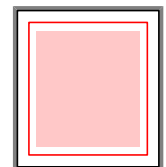
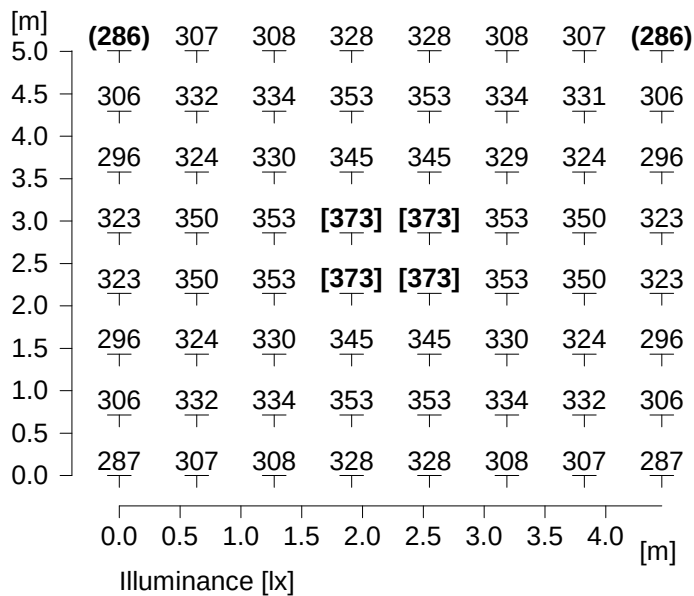
4	9	Thorn	
		Order No.	: 96242098
		Luminaire name	: CETUS LED 2000 HF 840 [STD]
		Equipment	: 1 x CTUL_2000_840 20 W / 1950 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

13 Room12

13.3 Calculation results, Room12

13.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

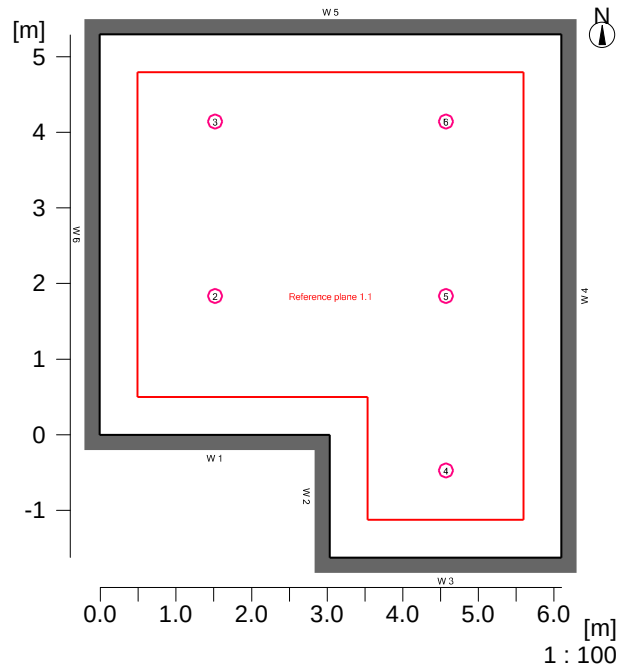
Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 328 lx
Maximum illuminance	Emax	: 286 lx
Uniformity Uo	Emin/Eav	: 373 lx
Diversity Ud	Emin/Emax	: 1 : 1.15 (0.87)
		: 1 : 1.30 (0.77)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

14 Room13

14.1 Description, Room13

14.1.1 Floor plan



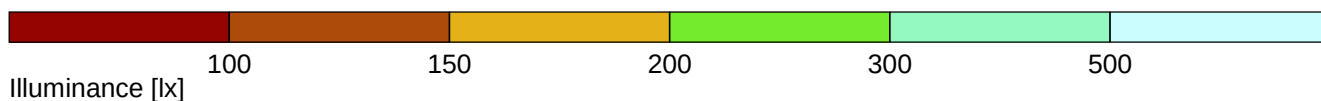
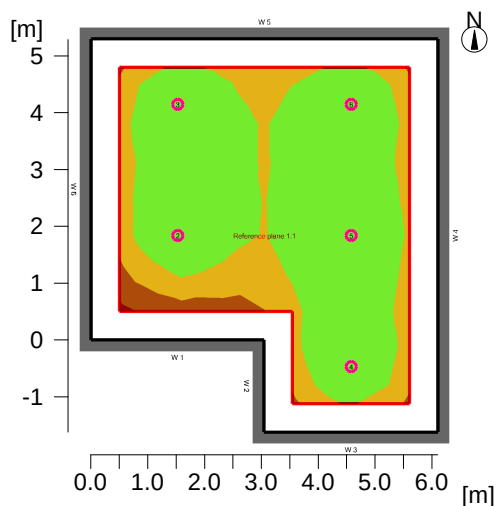
Wall	x	y	Length	Reflectance
1	3.04 m	0.00 m	3.04 m	50.0 %
2	3.04 m	-1.62 m	1.62 m	50.0 %
3	6.10 m	-1.62 m	3.06 m	50.0 %
4	6.10 m	5.28 m	6.90 m	50.0 %
5	0.00 m	5.28 m	6.10 m	50.0 %
6	0.00 m	0.00 m	5.28 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.75 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

14 Room13

14.2 Summary, Room13

14.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.70 m
Maintenance factor	0.80
Total luminous flux of all lamps	9750 lm
Total power	97.5 W
Total power per area (37.20 m²)	2.62 W/m² (1.27 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

	Horizontal
Em	207 lx
Emin	99 lx
Emin/Eav (Uo)	0.48
Emin/Emax (Ud)	0.36
UGR (4.1H 4.6H)	<=23.3
Position	0.75 m

Type No. \ Make

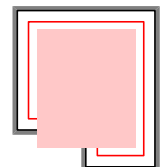
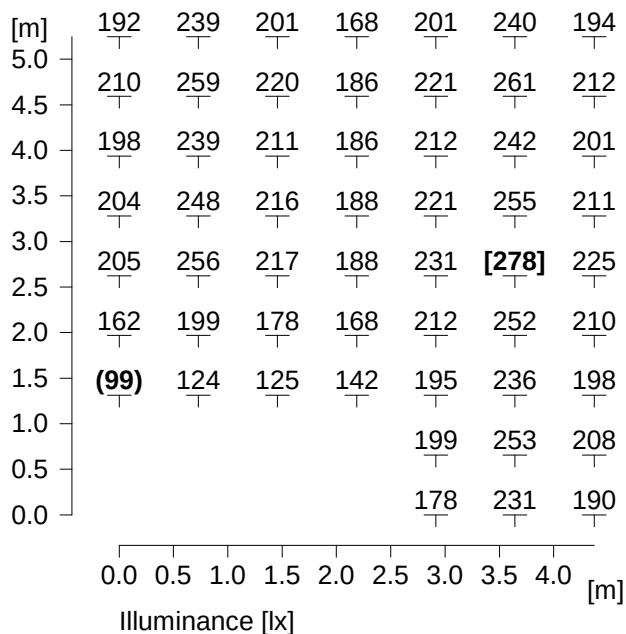
4	5	Thorn
		Order No. : 96242098
		Luminaire name : CETUS LED 2000 HF 840 [STD]
		Equipment : 1 x CTUL_2000_840 20 W / 1950 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

14 Room13

14.3 Calculation results, Room13

14.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

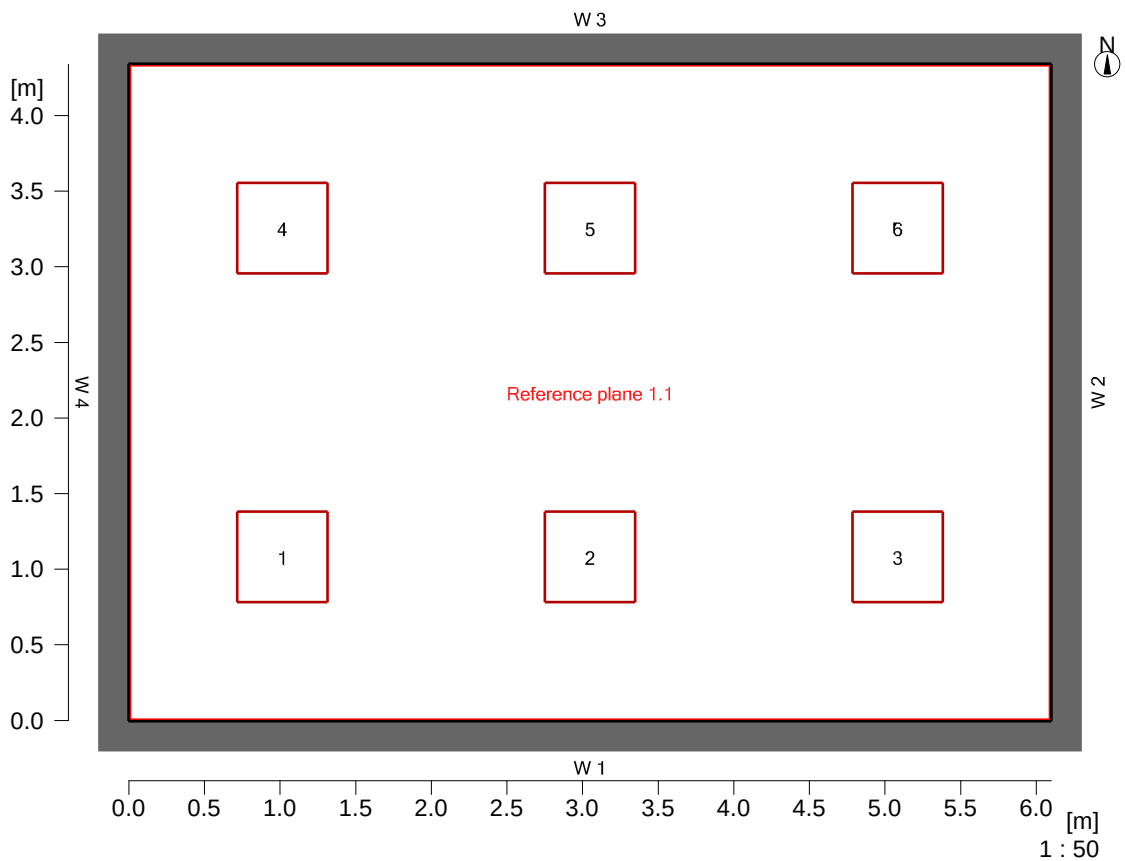
Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 207 lx
Maximum illuminance	Emax	: 99 lx
Uniformity Uo	Emin/Eav	: 278 lx
Diversity Ud	Emin/Emax	: 1 : 2.09 (0.48)
		: 1 : 2.80 (0.36)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

15 Room14

15.1 Description, Room14

15.1.1 Floor plan



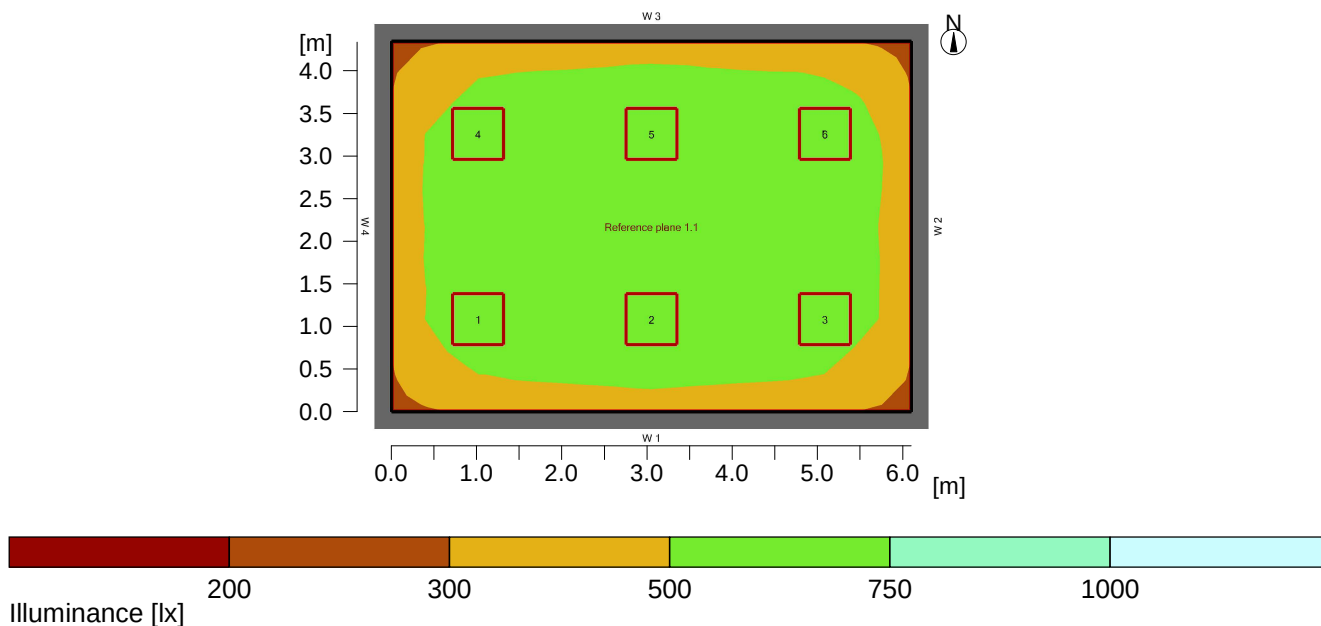
Wall	x	y	Length	Reflectance
1	6.10 m	0.00 m	6.10 m	50.0 %
2	6.10 m	4.34 m	4.34 m	50.0 %
3	0.00 m	4.34 m	6.10 m	50.0 %
4	0.00 m	0.00 m	4.34 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.75 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

15 Room14

15.2 Summary, Room14

15.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used
 Height of luminaire plane
 Maintenance factor

Average indirect fraction
 2.70 m
 0.80

Total luminous flux of all lamps
 Total power
 Total power per area (26.46 m²)

24000 lm
 219.0 W
 8.28 W/m² (1.54 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

Horizontal
 E_m 538 lx
 E_{min} 378 lx
 E_{min}/E_{av} (U_o) 0.70
 E_{min}/E_{max} (U_d) 0.58
 UGR (2.9H 4.1H) ≤20.0
 Position 0.75 m

Type No. \ Make

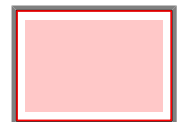
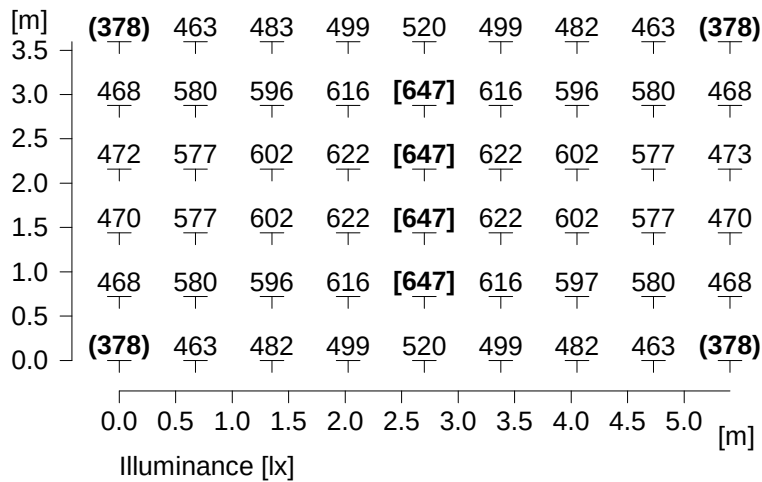
5	6	Thorn
		Order No. : 96629745
		Luminaire name : OMEGA LED 4000-840 HF Q597 [STD]
		Equipment : 1 x OMGL_H40 36 W / 4000 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

15 Room14

15.3 Calculation results, Room14

15.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

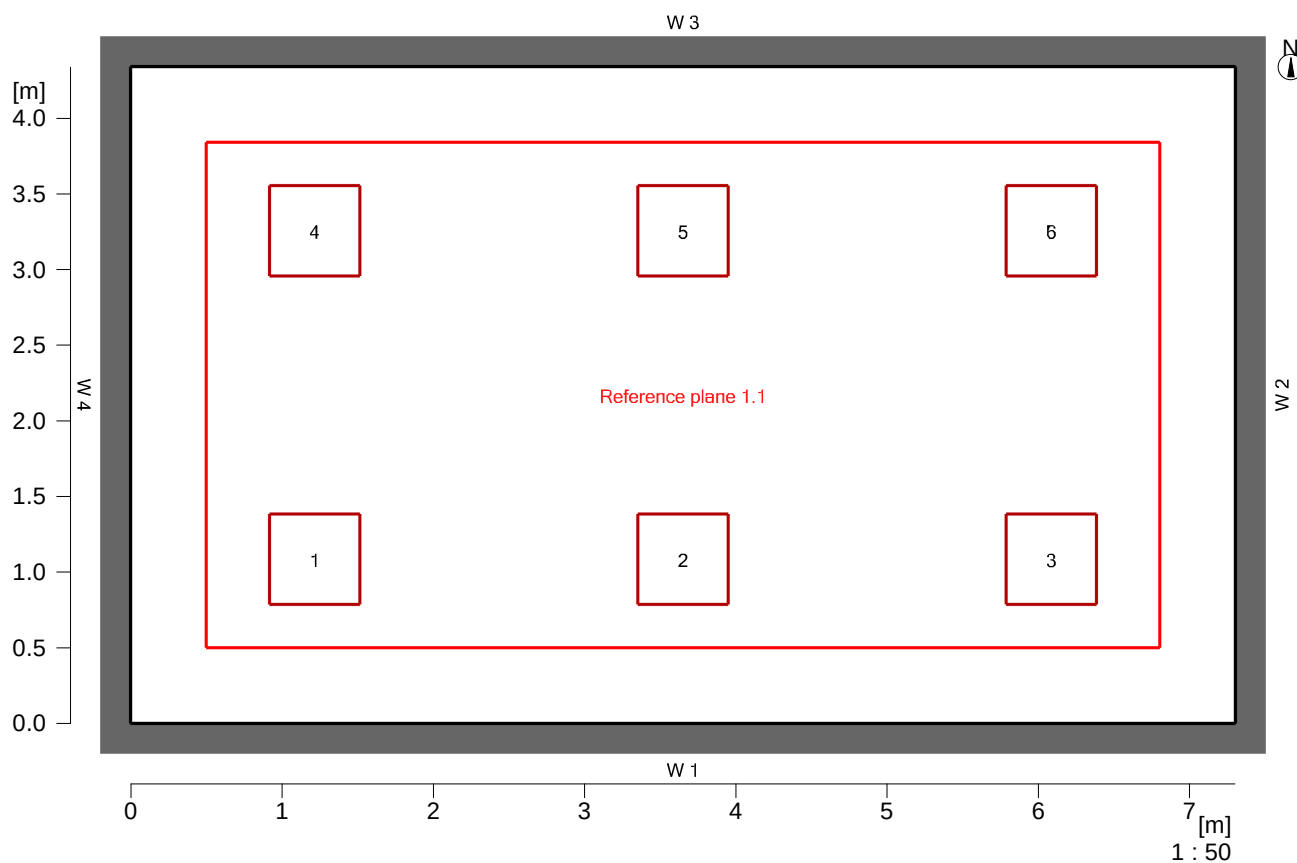
	: 0.75 m
Average illuminance	Eav : 538 lx
Minimum illuminance	Emin : 378 lx
Maximum illuminance	Emax : 647 lx
Uniformity U _o	Emin/Eav : 1 : 1.42 (0.70)
Diversity U _d	Emin/Emax : 1 : 1.71 (0.58)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

16 Room15

16.1 Description, Room15

16.1.1 Floor plan



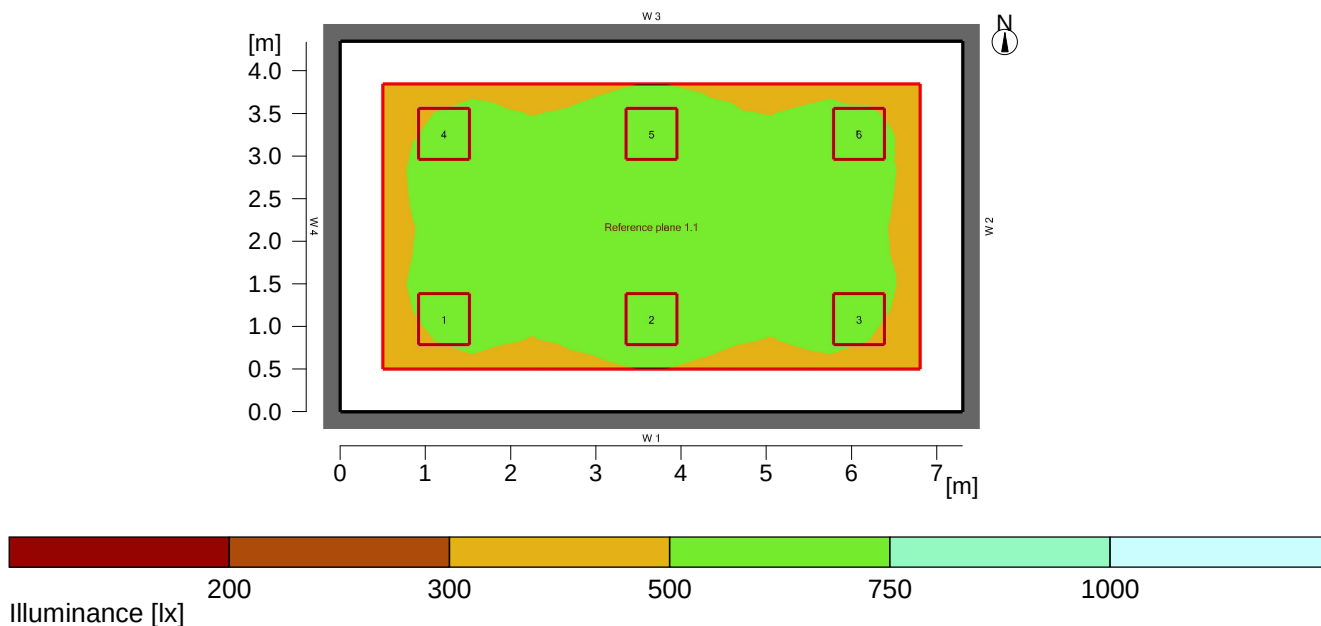
Wall	x	y	Length	Reflectance
1	7.30 m	0.00 m	7.30 m	50.0 %
2	7.30 m	4.34 m	4.34 m	50.0 %
3	0.00 m	4.34 m	7.30 m	50.0 %
4	0.00 m	0.00 m	4.34 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.75 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

16 Room15

16.2 Summary, Room15

16.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.70 m
Maintenance factor	0.80
Total luminous flux of all lamps	24000 lm
Total power	219.0 W
Total power per area (31.66 m ²)	6.92 W/m ² (1.36 W/m ² /100lx)

Evaluation area 1

Reference plane 1.1

	Horizontal
Em	508 lx
Emin	460 lx
Emin/Eav (Uo)	0.91
Emin/Emax (Ud)	0.79
UGR (2.9H 4.9H)	<=20.0
Position	0.75 m

Type No. \ Make

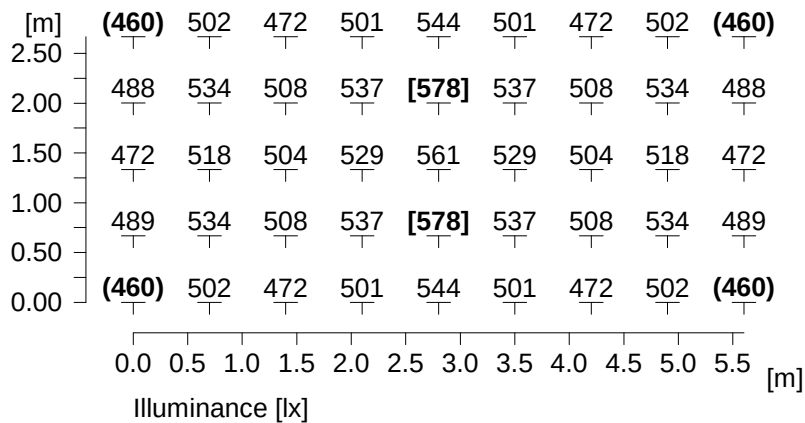
5	6	Thorn
		Order No. : 96629745
		Luminaire name : OMEGA LED 4000-840 HF Q597 [STD]
		Equipment : 1 x OMGL_H40 36 W / 4000 lm

Object : EP KOPER
Installation : INDUSTRY
Project number : 503/17
Date : 18.12.2017

16 Room15

16.3 Calculation results, Room15

16.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

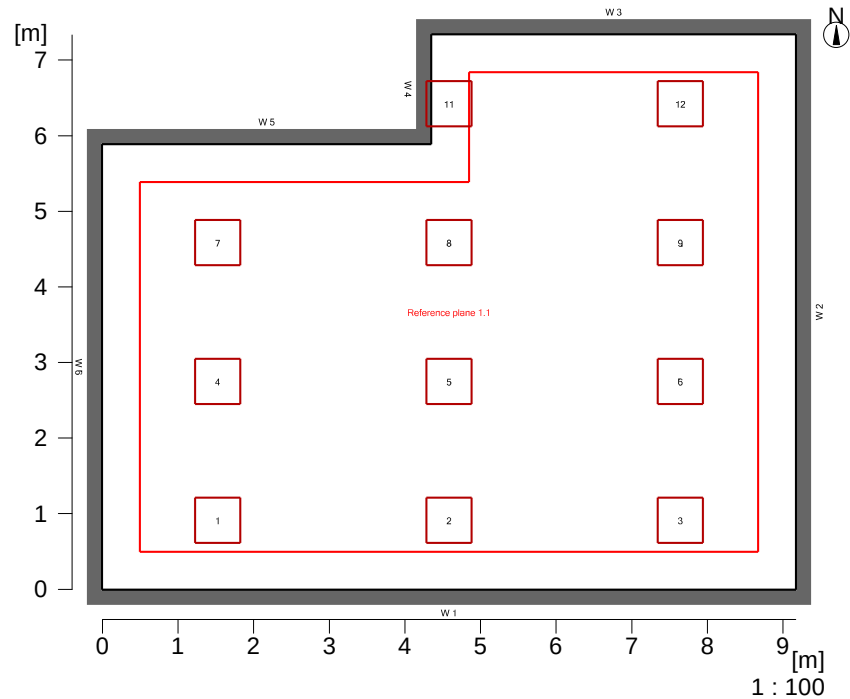
Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 508 lx
Maximum illuminance	Emax	: 460 lx
Uniformity Uo	Emin/Eav	: 1 : 1.10 (0.91)
Diversity Ud	Emin/Emax	: 1 : 1.26 (0.79)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

17 Room16

17.1 Description, Room16

17.1.1 Floor plan



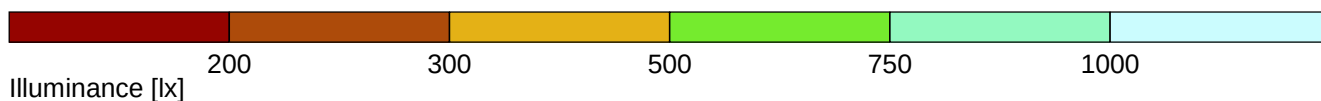
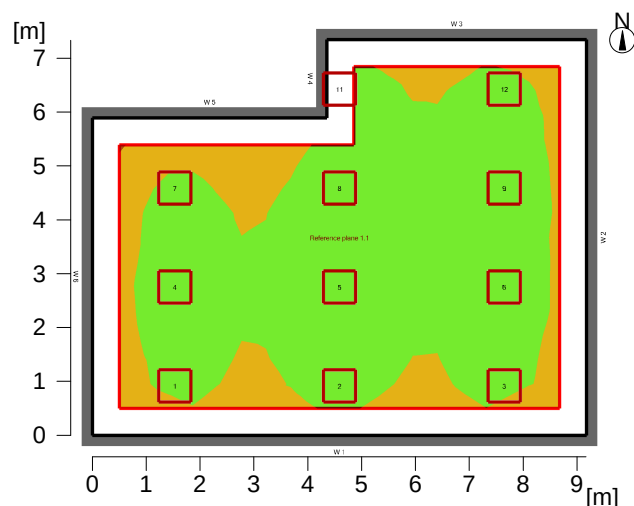
Wall	x	y	Length	Reflectance
1	9.17 m	-0.00 m	9.17 m	50.0 %
2	9.17 m	7.33 m	7.33 m	50.0 %
3	4.35 m	7.33 m	4.82 m	50.0 %
4	4.35 m	5.88 m	1.45 m	50.0 %
5	0.00 m	5.88 m	4.35 m	50.0 %
6	0.00 m	0.00 m	5.88 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.75 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

17 Room16

17.2 Summary, Room16

17.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used
 Height of luminaire plane
 Maintenance factor

Average indirect fraction
 2.70 m
 0.80

Total luminous flux of all lamps
 Total power
 Total power per area (60.90 m²)

44000 lm
 401.5 W
 6.59 W/m² (1.25 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

Horizontal
 Em
 Emin
 Emin/Eav (Uo)
 Emin/Emax (Ud)
 UGR (6.2H 4.9H)
 Position

529 lx
 426 lx
 0.81
 0.65
 <=21.1
 0.75 m

Type No. \ Make

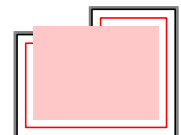
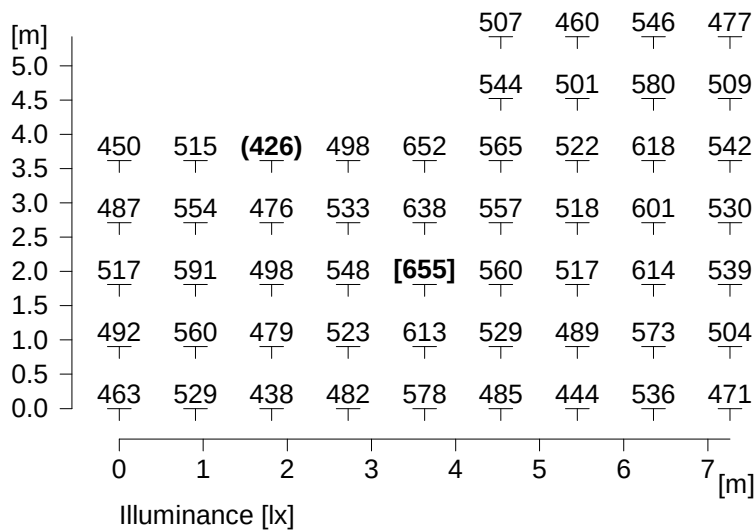
5 11 **Thorn**
 Order No. : 96629745
 Luminaire name : OMEGA LED 4000-840 HF Q597 [STD]
 Equipment : 1 x OMGL_H40 36 W / 4000 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

17 Room16

17.3 Calculation results, Room16

17.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

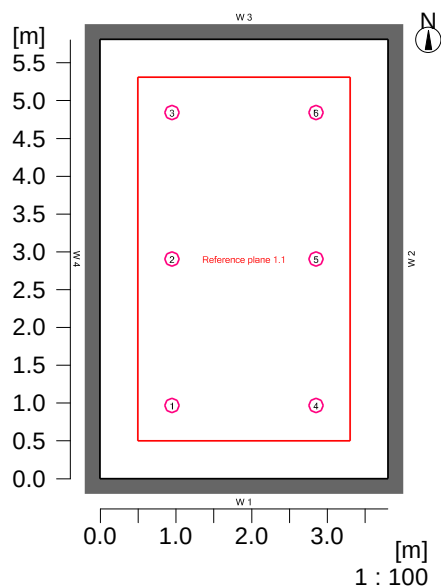
		: 0.75 m
Average illuminance	Eav	: 529 lx
Minimum illuminance	Emin	: 426 lx
Maximum illuminance	Emax	: 655 lx
Uniformity Uo	Emin/Eav	: 1 : 1.24 (0.81)
Diversity Ud	Emin/Emax	: 1 : 1.54 (0.65)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

18 Room17

18.1 Description, Room17

18.1.1 Floor plan



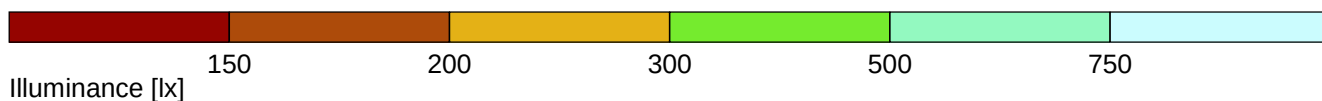
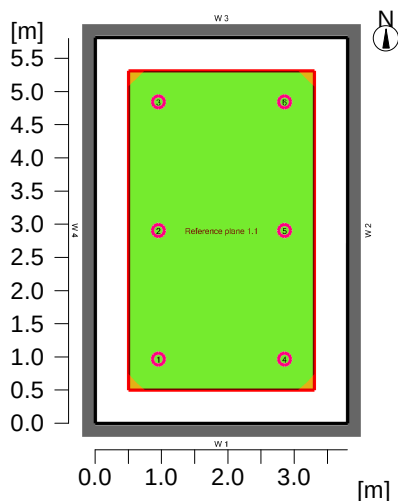
Wall	x	y	Length	Reflectance
1	3.80 m	0.00 m	3.80 m	50.0 %
2	3.80 m	5.80 m	5.80 m	50.0 %
3	0.00 m	5.80 m	3.80 m	50.0 %
4	0.00 m	0.00 m	5.80 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.75 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

18 Room17

18.2 Summary, Room17

18.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.70 m
Maintenance factor	0.80
Total luminous flux of all lamps	11700 lm
Total power	117.0 W
Total power per area (22.04 m²)	5.31 W/m² (1.45 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

	Horizon
Em	365 lx
Emin	322 lx
Emin/Eav (Uo)	0.88
Emin/Emax (Ud)	0.80
UGR (2.5H 3.9H)	<=22.7
Position	0.75 m

Type No. \ Make

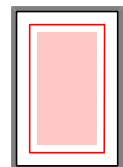
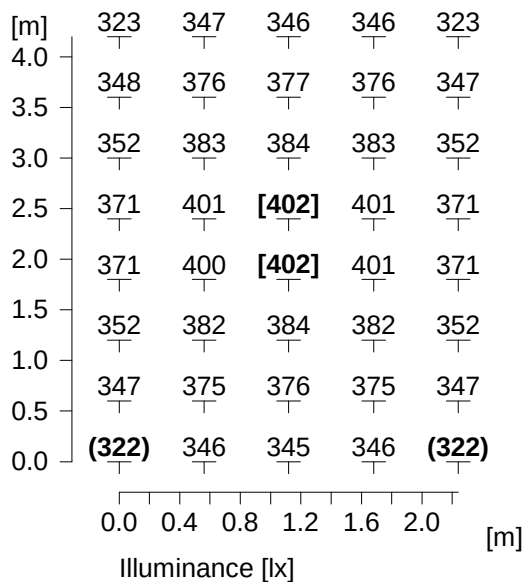
4	6	Thorn
		Order No. : 96242098
		Luminaire name : CETUS LED 2000 HF 840 [STD]
		Equipment : 1 x CTUL_2000_840 20 W / 1950 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

18 Room17

18.3 Calculation results, Room17

18.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

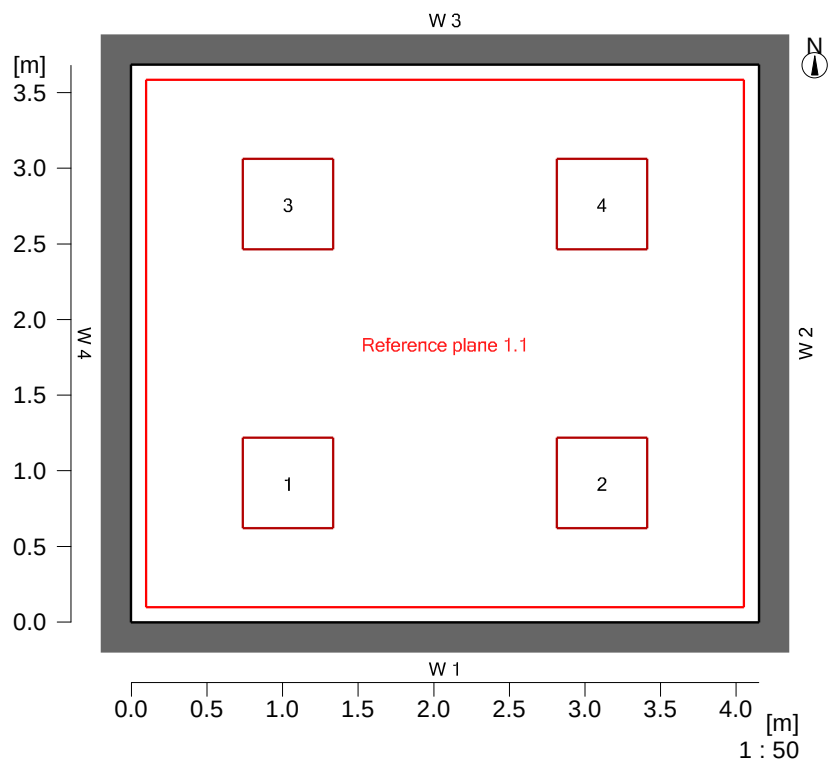
Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 365 lx
Maximum illuminance	Emax	: 322 lx
Uniformity Uo	Emin/Eav	: 402 lx
Diversity Ud	Emin/Emax	: 1 : 1.13 (0.88)
		: 1 : 1.25 (0.80)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

19 Room18

19.1 Description, Room18

19.1.1 Floor plan



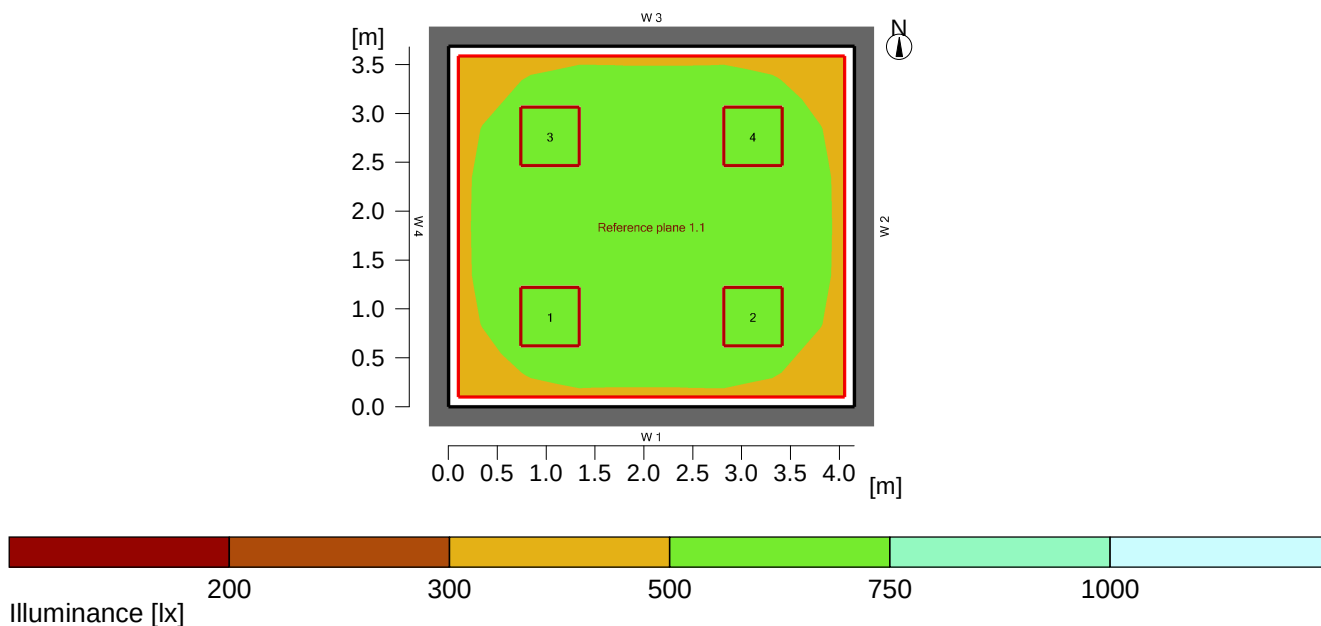
Wall	x	y	Length	Reflectance
1	4.15 m	0.00 m	4.15 m	50.0 %
2	4.15 m	3.68 m	3.68 m	50.0 %
3	0.00 m	3.68 m	4.15 m	50.0 %
4	0.00 m	0.00 m	3.68 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.75 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

19 Room18

19.2 Summary, Room18

19.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.70 m
Maintenance factor	0.80
Total luminous flux of all lamps	16000 lm
Total power	146.0 W
Total power per area (15.27 m²)	9.56 W/m² (1.72 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

Horizontal	
Em	556 lx
Emin	410 lx
Emin/Eav (Uo)	0.74
Emin/Emax (Ud)	0.64
UGR (2.5H 2.8H)	<=18.5
Position	0.75 m

Type No. Make

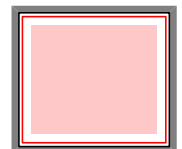
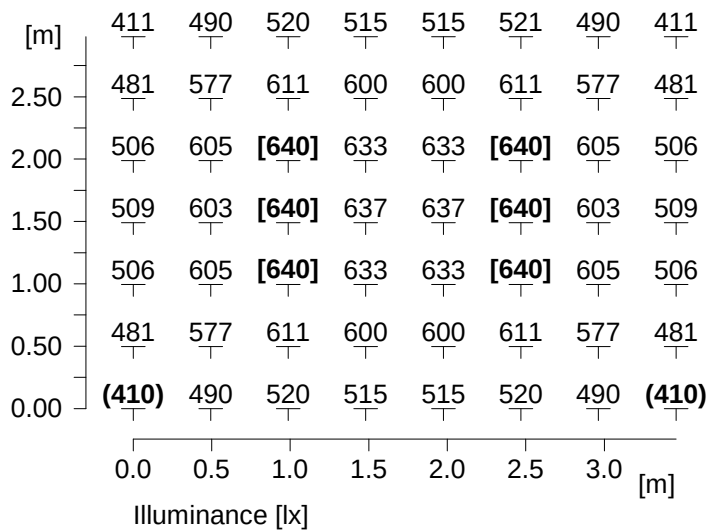
5	4	Thorn	
		Order No.	: 96629745
		Luminaire name	: OMEGA LED 4000-840 HF Q597 [STD]
		Equipment	: 1 x OMGL_H40 36 W / 4000 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

19 Room18

19.3 Calculation results, Room18

19.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

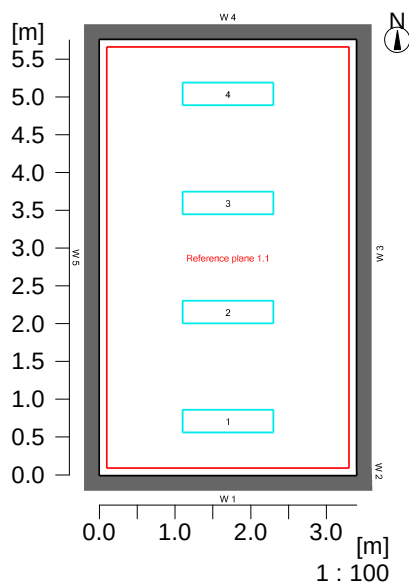
Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 556 lx
Maximum illuminance	Emax	: 410 lx
Uniformity Uo	Emin/Eav	: 640 lx
Diversity Ud	Emin/Emax	: 1 : 1.35 (0.74)
		: 1 : 1.56 (0.64)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

20 Room19

20.1 Description, Room19

20.1.1 Floor plan



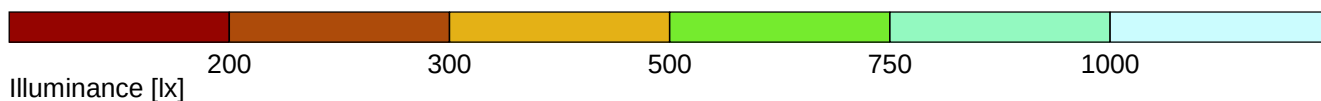
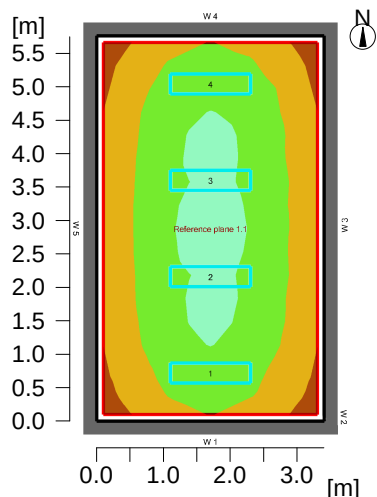
Wall	x	y	Length	Reflectance
1	3.40 m	0.00 m	3.40 m	50.0 %
2	3.40 m	0.10 m	0.10 m	50.0 %
3	3.40 m	5.75 m	5.65 m	50.0 %
4	-0.00 m	5.75 m	3.40 m	50.0 %
5	0.00 m	0.00 m	5.75 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		----		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

20 Room19

20.2 Summary, Room19

20.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used
 Height of luminaire plane
 Maintenance factor

Average indirect fraction
 2.70 m
 0.80

Total luminous flux of all lamps
 Total power
 Total power per area (19.55 m²)

14960 lm
 111.2 W
 5.69 W/m² (1.05 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

Horizontal
 Em 540 lx
 Emin 320 lx
 Emin/Eav (Uo) 0.59
 Emin/Emax (Ud) 0.41
 UGR (4.0H 2.4H) ≤18.6
 Position 0.75 m (rot: 0°/0°)

Type No. \ Make

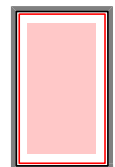
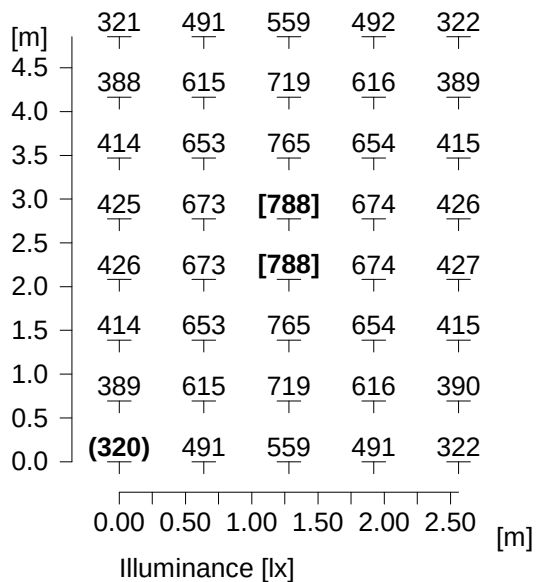
		Zumtobel
6	4	Order No. : 42928710
		Luminaire name : MIRL A LED3800-840 L1200 WB EVG [STD]
		Equipment : 1 x LED-Z42928730 28 W / 3740 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

20 Room19

20.3 Calculation results, Room19

20.3.1 Table, Reference plane 1.1 (E)



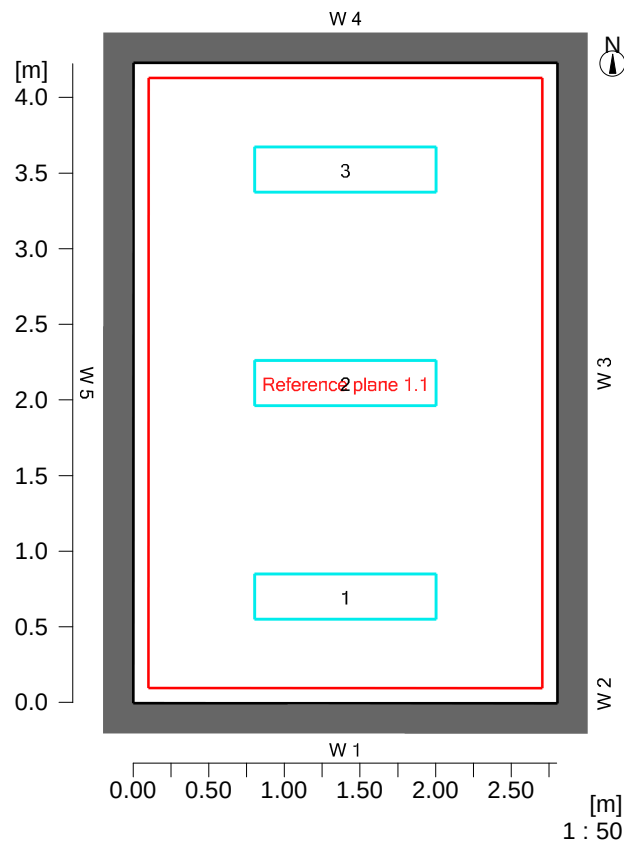
Average illuminance	Eav	: 540 lx
Minimum illuminance	Emin	: 320 lx
Maximum illuminance	Emax	: 788 lx
Uniformity Uo	Emin/Eav	: 1 : 1.69 (0.59)
Diversity Ud	Emin/Emax	: 1 : 2.46 (0.41)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

21 Room20

21.1 Description, Room20

21.1.1 Floor plan



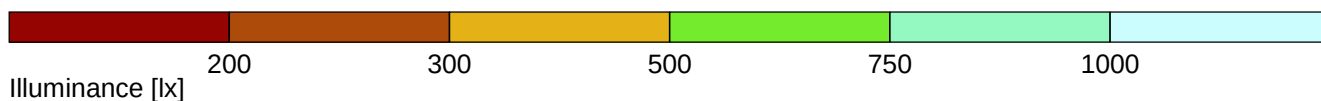
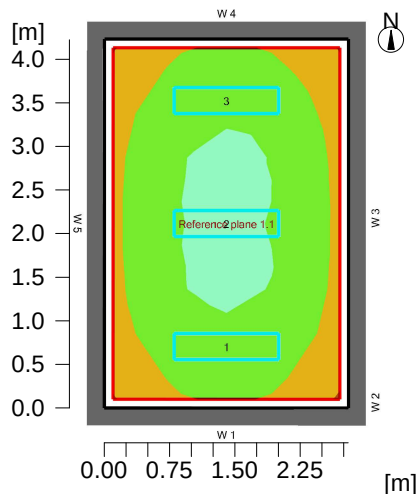
Wall	x	y	Length	Reflectance
1	2.80 m	-0.00 m	2.80 m	50.0 %
2	2.80 m	0.12 m	0.13 m	50.0 %
3	2.80 m	4.22 m	4.10 m	50.0 %
4	0.00 m	4.22 m	2.80 m	50.0 %
5	0.00 m	0.00 m	4.22 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		----		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

21 Room20

21.2 Summary, Room20

21.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.70 m
Maintenance factor	0.80
Total luminous flux of all lamps	11220 lm
Total power	83.4 W
Total power per area (11.83 m ²)	7.05 W/m ² (1.20 W/m ² /100lx)

Evaluation area 1

Reference plane 1.1

	Horizontal
Em	587 lx
Emin	395 lx
Emin/Eav (Uo)	0.67
Emin/Emax (Ud)	0.50
UGR (1.9H 2.9H)	<=18.5
Position	0.75 m (rot: 0°/0.02°)

Type No. \ Make

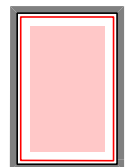
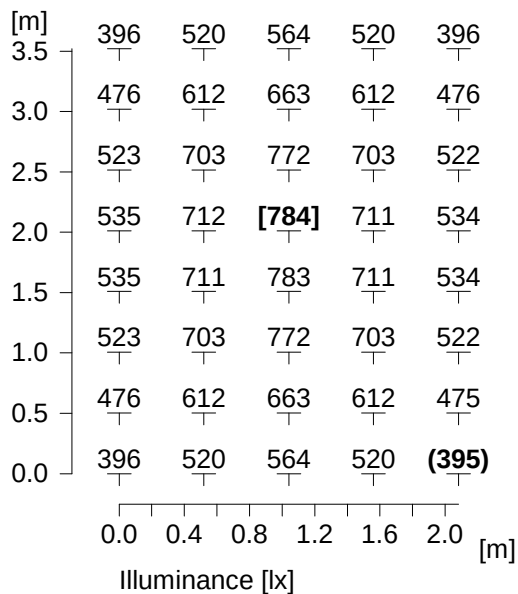
6	3	Zumtobel	
		Order No.	: 42928710
		Luminaire name	: MIRL A LED3800-840 L1200 WB EVG [STD]
		Equipment	: 1 x LED-Z42928730 28 W / 3740 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

21 Room20

21.3 Calculation results, Room20

21.3.1 Table, Reference plane 1.1 (E)



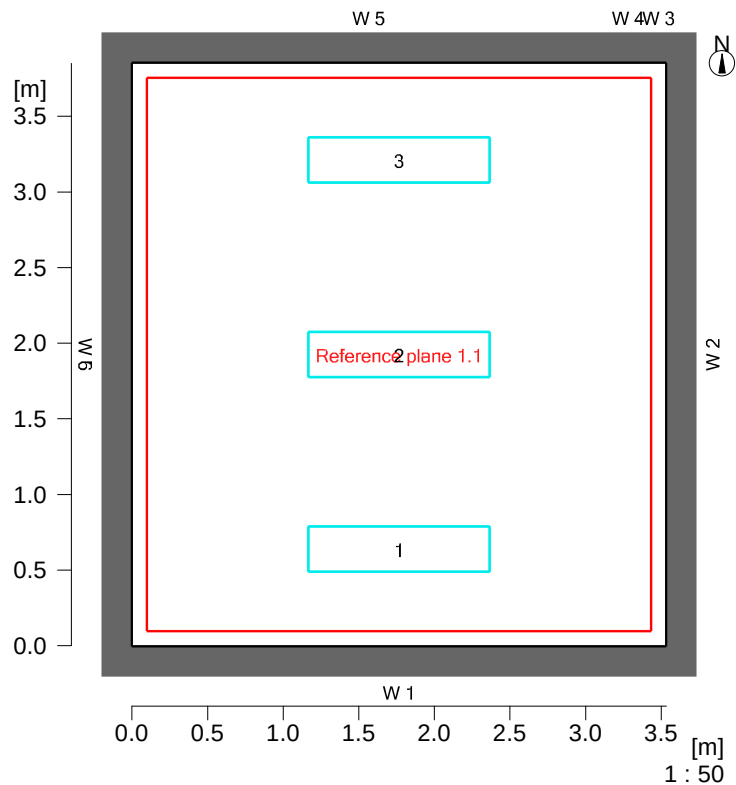
Average illuminance	Eav	: 587 lx
Minimum illuminance	Emin	: 395 lx
Maximum illuminance	Emax	: 784 lx
Uniformity Uo	Emin/Eav	: 1 : 1.49 (0.67)
Diversity Ud	Emin/Emax	: 1 : 1.98 (0.50)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

22 Room21

22.1 Description, Room21

22.1.1 Floor plan



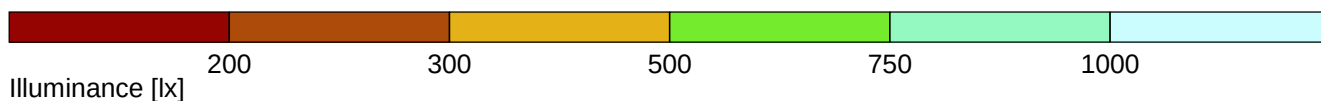
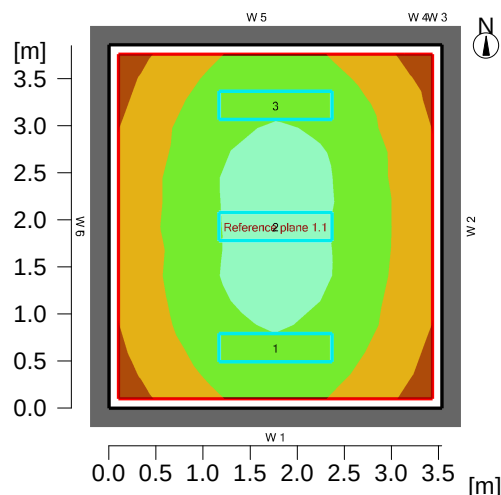
Wall	x	y	Length	Reflectance
1	3.53 m	-0.00 m	3.53 m	50.0 %
2	3.53 m	3.85 m	3.85 m	50.0 %
3	3.43 m	3.85 m	0.10 m	50.0 %
4	3.13 m	3.85 m	0.30 m	50.0 %
5	0.00 m	3.85 m	3.13 m	50.0 %
6	0.00 m	0.00 m	3.85 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		----		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

22 Room21

22.2 Summary, Room21

22.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.70 m
Maintenance factor	0.80
Total luminous flux of all lamps	11220 lm
Total power	83.4 W
Total power per area (13.60 m ²)	6.13 W/m ² (1.12 W/m ² /100lx)

Evaluation area 1

Reference plane 1.1

Em	547 lx
Emin	294 lx
Emin/Eav (Uo)	0.54
Emin/Emax (Ud)	0.36
UGR (2.4H 2.7H)	<=18.5
Position	0.75 m (rot: 0°/0°)

Type No. \ Make

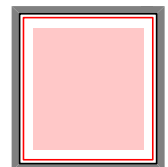
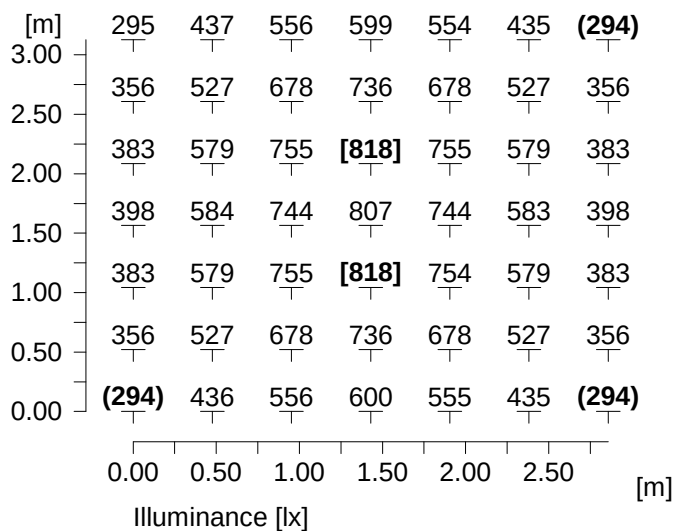
6	3	Zumtobel
		Order No. : 42928710
		Luminaire name : MIRL A LED3800-840 L1200 WB EVG [STD]
		Equipment : 1 x LED-Z42928730 28 W / 3740 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

22 Room21

22.3 Calculation results, Room21

22.3.1 Table, Reference plane 1.1 (E)



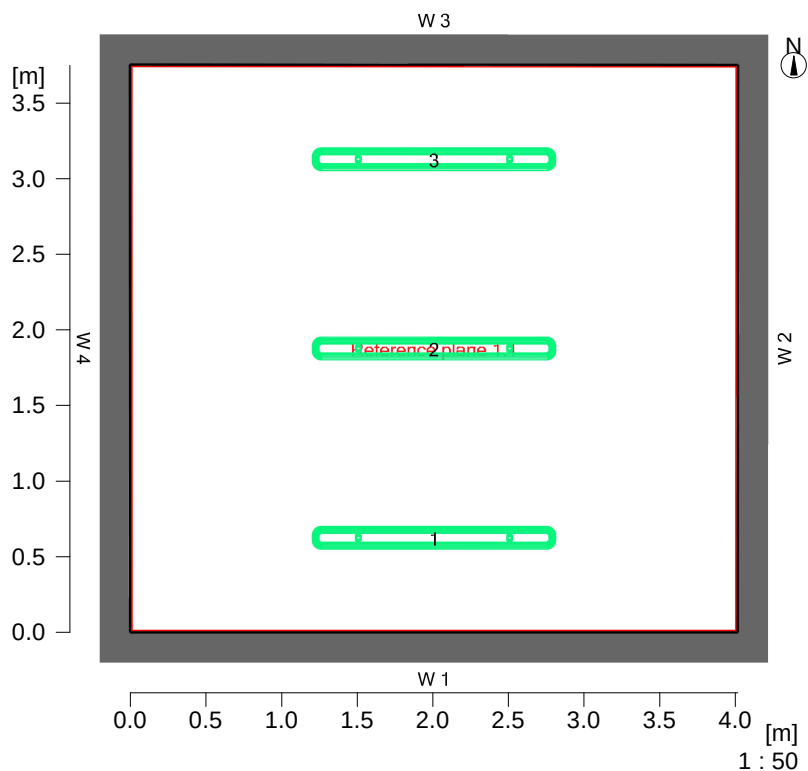
Average illuminance	Eav	: 547 lx
Minimum illuminance	Emin	: 294 lx
Maximum illuminance	Emax	: 818 lx
Uniformity Uo	Emin/Eav	: 1 : 1.86 (0.54)
Diversity Ud	Emin/Emax	: 1 : 2.79 (0.36)

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

23 Room22

23.1 Description, Room22

23.1.1 Floor plan



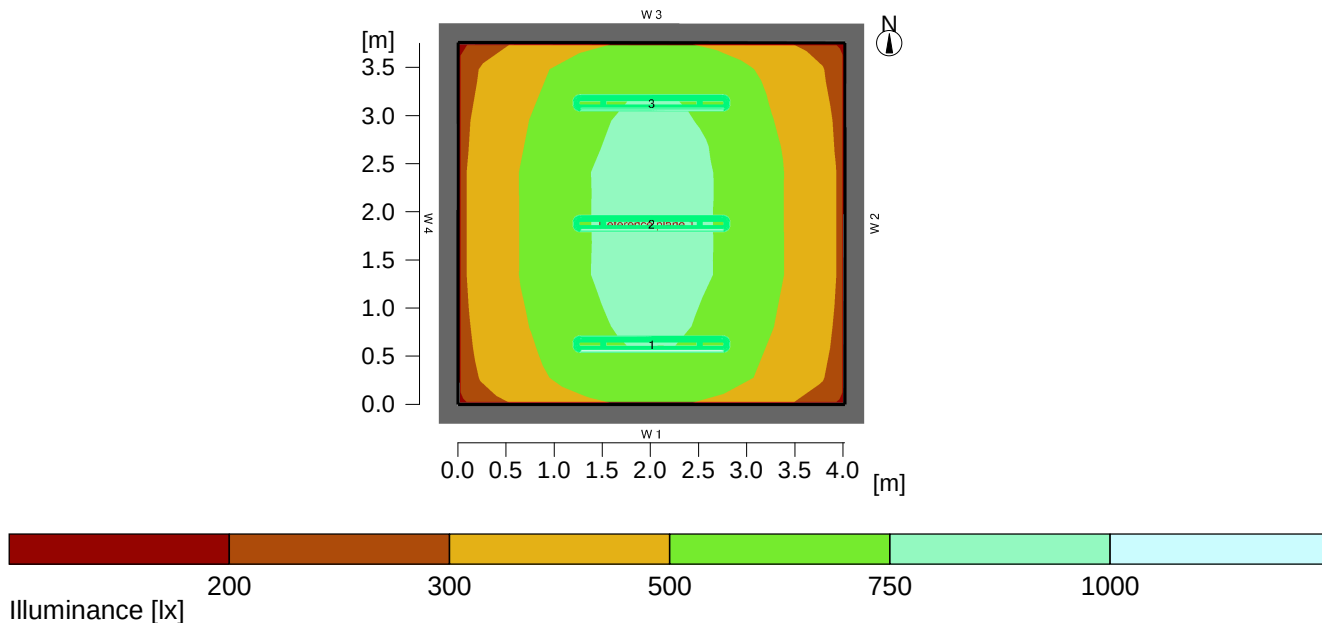
Wall	x	y	Length	Reflectance
1	4.02 m	0.00 m	4.02 m	50.0 %
2	4.02 m	3.75 m	3.75 m	50.0 %
3	-0.00 m	3.75 m	4.02 m	50.0 %
4	0.00 m	0.00 m	3.75 m	50.0 %
Floor				20.0 %
Ceiling				20.0 %
Room height		2.70 m		
Height of reference plane		0.75 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

23 Room22

23.2 Summary, Room22

23.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used
 Height of luminaire plane
 Maintenance factor

Average indirect fraction
 2.70 m
 0.80

Total luminous flux of all lamps
 Total power
 Total power per area (15.06 m²)

19200 lm
 159.0 W
 10.56 W/m² (1.92 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

Horizontal
 E_m 549 lx
 E_{min} 301 lx
 E_{min}/E_{av} (U_o) 0.55
 E_{min}/E_{max} (U_d) 0.38
 UGR (2.6H 2.8H) ≤22.1
 Position 0.75 m

Type No. \ Make

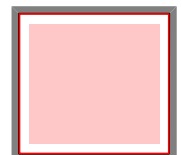
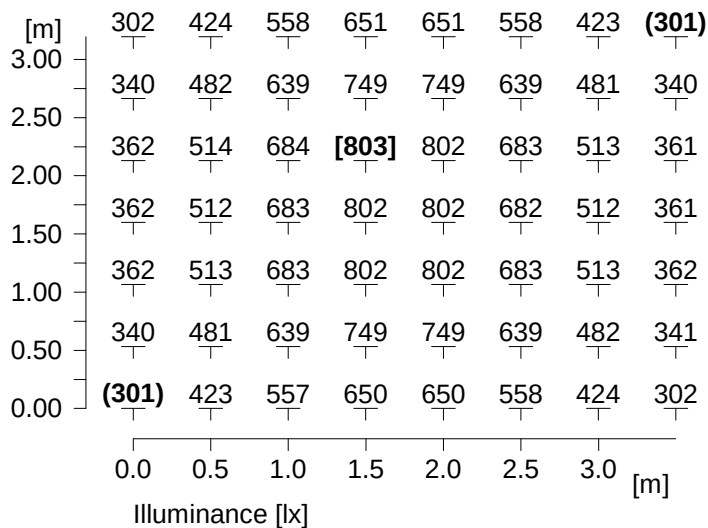
7 3 **Thorn**
 Order No. : 96241871
 Luminaire name : AQUAF2 LED 6400 HF L840 [STD]
 Equipment : 1 x LED_AQUL_6748 53 W / 6400 lm

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

23 Room22

23.3 Calculation results, Room22

23.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

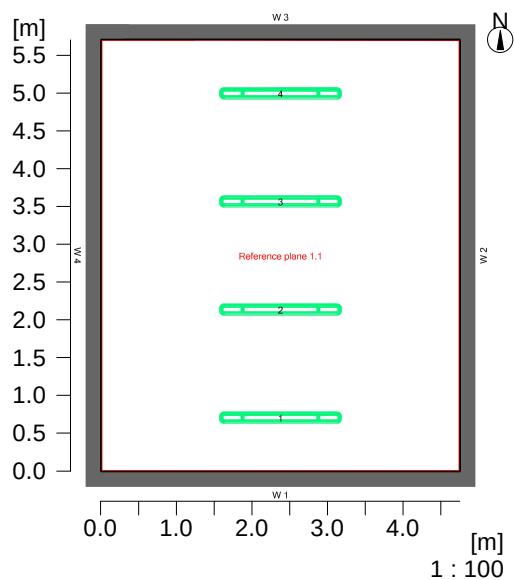
Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 549 lx
Maximum illuminance	Emax	: 301 lx
Uniformity Uo	Emin/Eav	: 803 lx
Diversity Ud	Emin/Emax	: 1 : 1.82 (0.55)
		: 1 : 2.66 (0.38)

Object : EP KOPER
Installation : INDUSTRY
Project number : 503/17
Date : 18.12.2017

24 Room23

24.1 Description, Room23

24.1.1 Floor plan



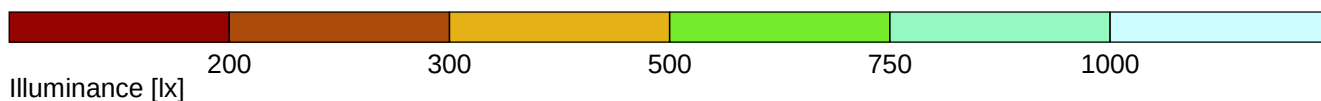
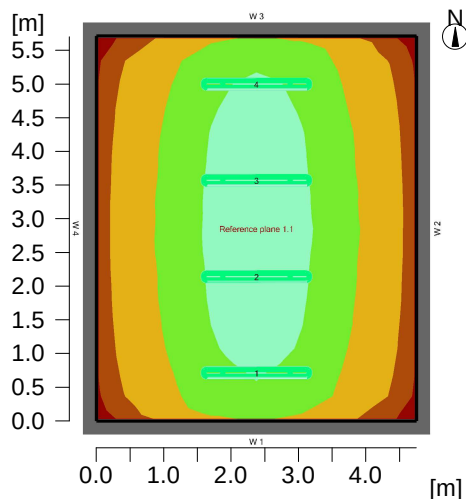
Wall	x	y	Length	Reflectance
1	4.75 m	0.00 m	4.75 m	50.0 %
2	4.75 m	5.70 m	5.70 m	50.0 %
3	0.00 m	5.70 m	4.75 m	50.0 %
4	0.00 m	0.00 m	5.70 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.75 m		

Object : EP KOPER
 Installation : INDUSTRY
 Project number : 503/17
 Date : 18.12.2017

24 Room23

24.2 Summary, Room23

24.2.1 Result overview, Evaluation area 1



General

Calculation algorithm used
 Height of luminaire plane
 Maintenance factor

Average indirect fraction
 2.70 m
 0.80

Total luminous flux of all lamps
 Total power
 Total power per area (27.05 m²)

25600 lm
 212.0 W
 7.84 W/m² (1.46 W/m²/100lx)

Evaluation area 1

Reference plane 1.1

Horizontal
 E_m 537 lx
 E_{min} 270 lx
 E_{min}/E_{av} (U_o) 0.50
 E_{min}/E_{max} (U_d) 0.31
 UGR (3.3H 4.0H) ≤23.7
 Position 0.75 m

Type No. \ Make

Thorn	
7	4
Order No.	: 96241871
Luminaire name	: AQUAF2 LED 6400 HF L840 [STD]
Equipment	: 1 x LED_AQUL_6748 53 W / 6400 lm

zumtobel group