

# TELOVADNICA VIŽMARJE

Installation : EDUCATION AND SCIENCE

Project number : 420/17

Customer : MEDPROSTOR

Processed by : ZUMTOBEL

Date : 22.08.2017

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 : TELOVADNICA VIŽMARJE  
Installation : EDUCATION AND SCIENCE  
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Date : 22.08.2017



## 1 Luminaire data

### 1.1 Zumtobel, TECTON C LED16000-840 L2000 WB ... (42184978)

#### 1.1.1 Data sheet

Manufacturer: Zumtobel

#### 42184978 Surface-mounted suspended TECTON C LED16000-840 L2000 WB LDE WH [STD]

Linear, energy-efficient TECTON LED continuous-row luminaire with 64 highly efficient mid-power LEDs per segment. Total power: 104 W, DALI controllable luminaire with LED converter, makes environmental and financial sense. LED service life lasts 50000 h before luminous flux is reduced to 90% of the initial value. Chromaticity tolerance (initial MacAdam): 3. Luminaire efficacy: 154 lm/W. Luminaire luminous flux: 16000 lm. Luminaire with symmetric wide light distribution (wide beam). Colour rendering  $R_a > 80$ , colour temperature 4000 K. Split lens concept for reducing perceived glare. Overlapping PMMA lenses (shatter-resistant to IK07) achieve IP50 protection for LED and optic. All-in-one solution: lighting batten, lamp and reflector are combined in one product to produce a 100 % continuous ribbon of LED light without gaps. High-quality look in a design that matches the trunking. Dimming level for DC mode preset to 15 %. LED continuous-row luminaire of sheet steel, enamelled in polyester lacquer finish, white. 100% flexible, tool-free mechanical and electrical installation using CLIX-technology by means of two side-mounted rotary levers on the TECTON trunking. No ultraviolet or infrared radiation. ambient temperature:  $-20^{\circ}\text{C}$  to  $+25^{\circ}\text{C}$  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. Dimensions: 1997 x 60 x 85 mm. Weight: 2.8 kg.

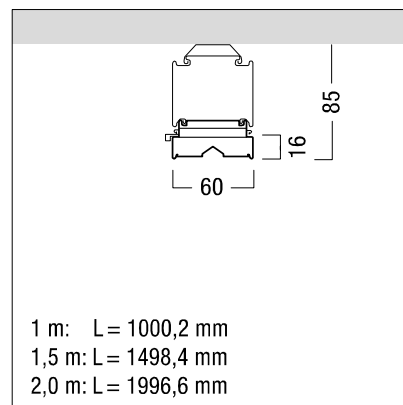
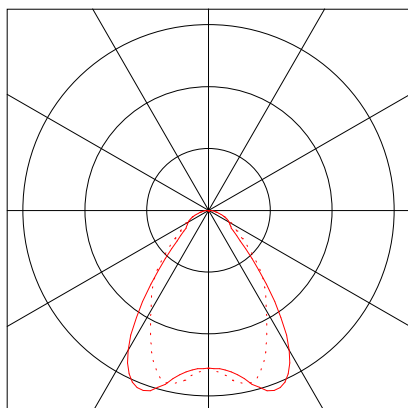
#### Luminaire data

Absolute Photometry  
Luminaire efficacy : 153.85 lm/W  
Classification : A50  $\downarrow 99.9\%$   $\uparrow 0.1\%$   
CIE Flux Codes : 69 91 98 100 100  
UGR 4H 8H : 25.0 / 25.0  
Power : 104 W  
Luminous flux : 16000 lm

#### Equipped with

Quantity : 1  
Designation : LED-Z42184978  
Colour : Unknown  
Colour reproduction : 80

Dimensions : 1997 mm x 60 mm x 85 mm

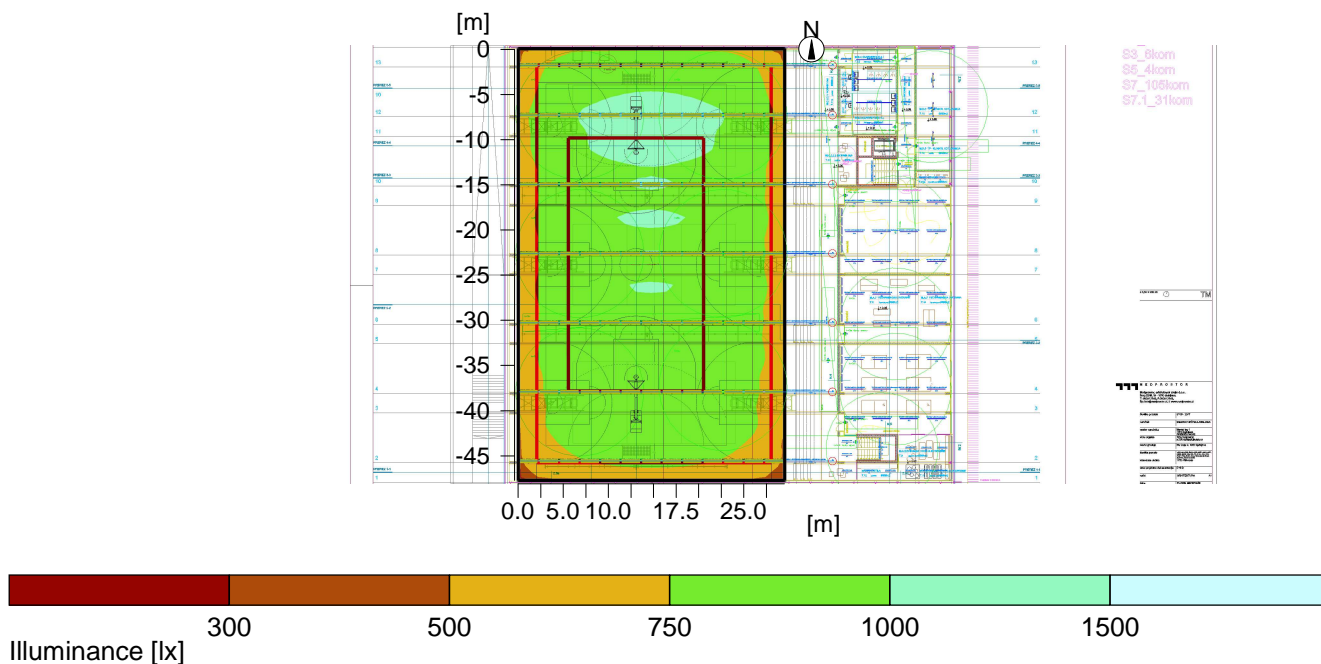


Object : TELOVADNICA VIŽMARJE  
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## 2 Room 1

### 2.1 Summary, Room 1

#### 2.1.1 Result overview, Evaluation area 1



#### General

Calculation algorithm used  
 Height of luminaire plane  
 Maintenance factor

Average indirect fraction  
 11.12 m  
 0.80

Total luminous flux of all lamps  
 Total power  
 Total power per area (1406.68 m<sup>2</sup>)

1456000 lm  
 9464.0 W  
 6.73 W/m<sup>2</sup> (0.81 W/m<sup>2</sup>/100lx)

#### Evaluation area 1

#### Reference plane 1.1

Horizontal  
 Em 828 lx  
 Emin 503 lx  
 Emin/Eav (Uo) 0.61  
 Emin/Emax (Ud) 0.49  
 UGR (3.0H 4.9H) <=24.3  
 Position 0.03 m

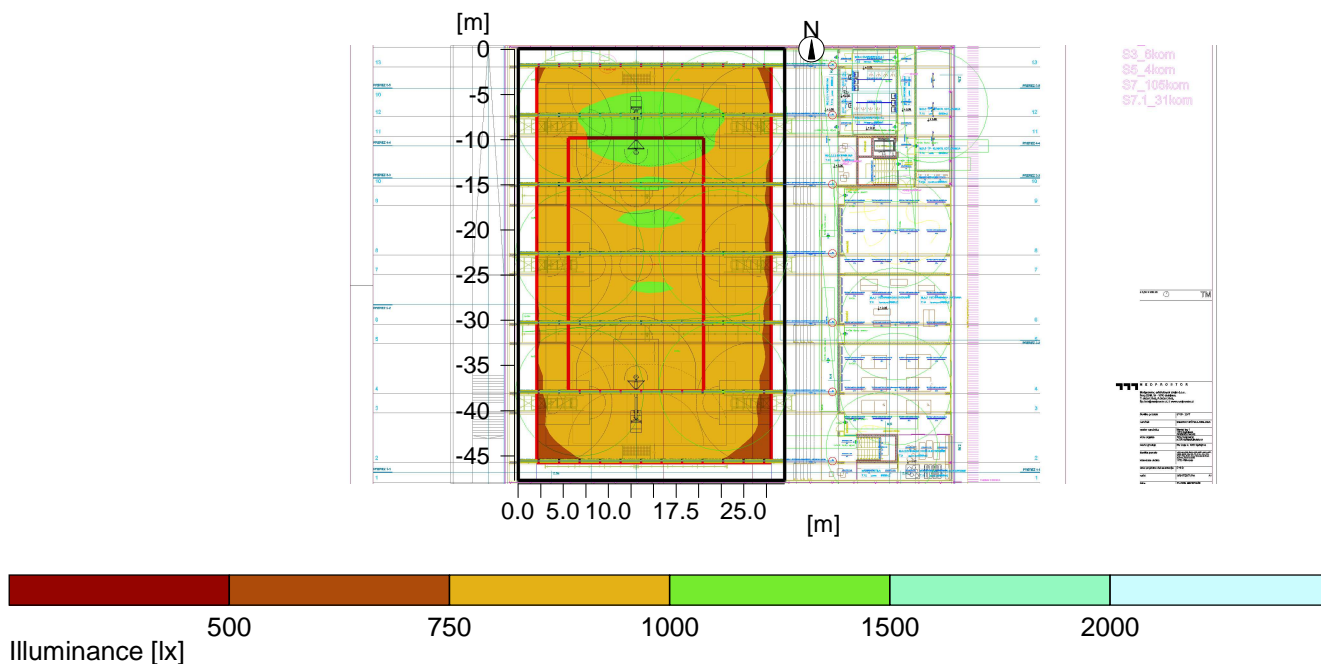
#### Type No. Make

1	91	<b>Zumtobel</b>	
		Order No.	: 42184978
		Luminaire name	: TECTON C LED16000-840 L2000 WB LDE WH [STD]
		Equipment	: 1 x LED-Z42184978 104 W / 16000 lm

Object : TELOVADNICA VIŽMARJE  
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## 2.1 Summary, Room 1

### 2.1.2 Result overview, Evaluation area 2



#### General

Calculation algorithm used  
 Height of luminaire plane  
 Maintenance factor

Average indirect fraction  
 11.12 m  
 0.80

Total luminous flux of all lamps  
 Total power  
 Total power per area (1139.30 m<sup>2</sup>)

1456000 lm  
 9464.0 W  
 8.31 W/m<sup>2</sup> (0.96 W/m<sup>2</sup>/100lx)

#### Evaluation area 2

#### Reference plane 2.1

Horizontal  
 Em  
 Emin  
 Emin/Eav (Uo)  
 Emin/Emax (Ud)  
 UGR (3.0H 4.9H)  
 Position

868 lx  
 630 lx  
 0.73  
 0.62  
 <=24.3  
 0.03 m

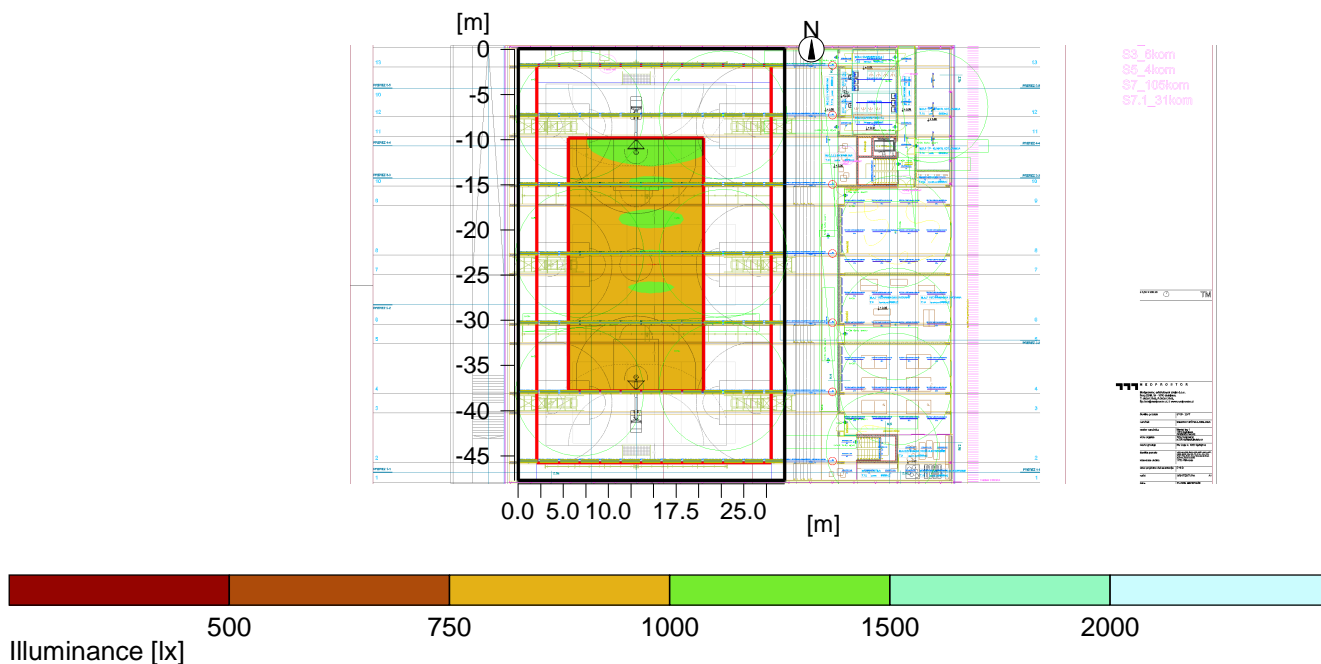
#### Type No. Make

1	91	<b>Zumtobel</b>	
		Order No.	: 42184978
		Luminaire name	: TECTON C LED16000-840 L2000 WB LDE WH [STD]
		Equipment	: 1 x LED-Z42184978 104 W / 16000 lm

Object : TELOVADNICA VIŽMARJE  
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## 2.1 Summary, Room 1

### 2.1.3 Result overview, Evaluation area 3



#### General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	11.12 m
Maintenance factor	0.80
Total luminous flux of all lamps	336000 lm
Total power	2184.0 W
Total power per area (418.32 m <sup>2</sup> )	5.22 W/m <sup>2</sup> (0.57 W/m <sup>2</sup> /100lx)

#### Evaluation area 3

#### Reference plane 3.1

Horizontal	
Em	922 lx
Emin	837 lx
Emin/Eav (Uo)	0.91
Emin/Emax (Ud)	0.84
UGR (3.0H 4.9H)	<=24.3
Position	0.03 m (rot: 0°/0.01°)

#### Type No. Make

1	21	<b>Zumtobel</b>	
		Order No.	: 42184978
		Luminaire name	: TECTON C LED16000-840 L2000 WB LDE WH [STD]
		Equipment	: 1 x LED-Z42184978 104 W / 16000 lm

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## 2 Room 1

### 2.2 Calculation results, Room 1

#### 2.2.1 Table, Reference plane 1.1 (E)

[m]	607	676	730	717	680	675	692	679	682	669	663	675	649	635	596	<b>(503)</b>
25.0	742	818	881	863	814	807	830	813	818	801	795	812	780	766	724	610
22.5	817	893	968	943	889	882	905	892	891	875	869	885	855	837	792	671
20.0	854	928	1010	981	927	919	941	932	927	911	907	920	894	871	825	703
17.5	868	942	<b>[1030]</b>	997	942	935	955	949	942	926	924	934	910	885	838	716
15.0	869	943	<b>[1030]</b>	997	943	935	955	949	942	926	924	934	910	885	838	716
12.5	855	929	1010	982	927	920	941	933	927	911	908	921	894	871	825	704
10.0	820	895	970	944	890	883	905	892	892	875	870	886	856	837	793	672
7.5	746	821	884	866	815	808	831	814	819	802	796	813	781	767	725	609
5.0	613	680	733	721	682	674	693	681	682	670	665	676	651	637	598	504
2.5																
0.0																
	0	5	10	15	20	25	30	35	40	[m]						
	Illuminance [lx]															



Height of the reference plane

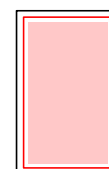
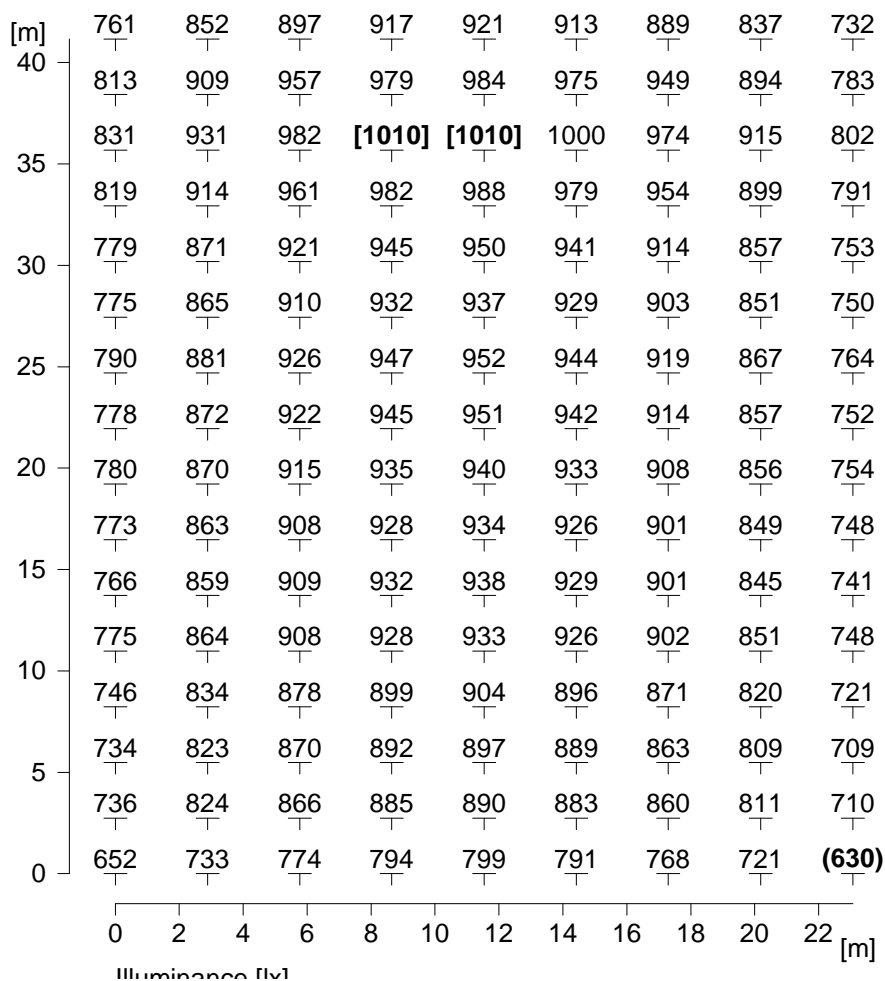
		: 0.03 m
Average illuminance	Eav	: 828 lx
Minimum illuminance	Emin	: 503 lx
Maximum illuminance	Emax	: 1030 lx
Uniformity Uo	Emin/Eav	: 1 : 1.65 (0.61)
Diversity Ud	Emin/Emax	: 1 : 2.05 (0.49)

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## 2.2 Calculation results, Room 1

### 2.2.2 Table, Reference plane 2.1 (E)



Height of the reference plane

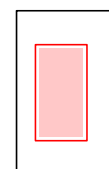
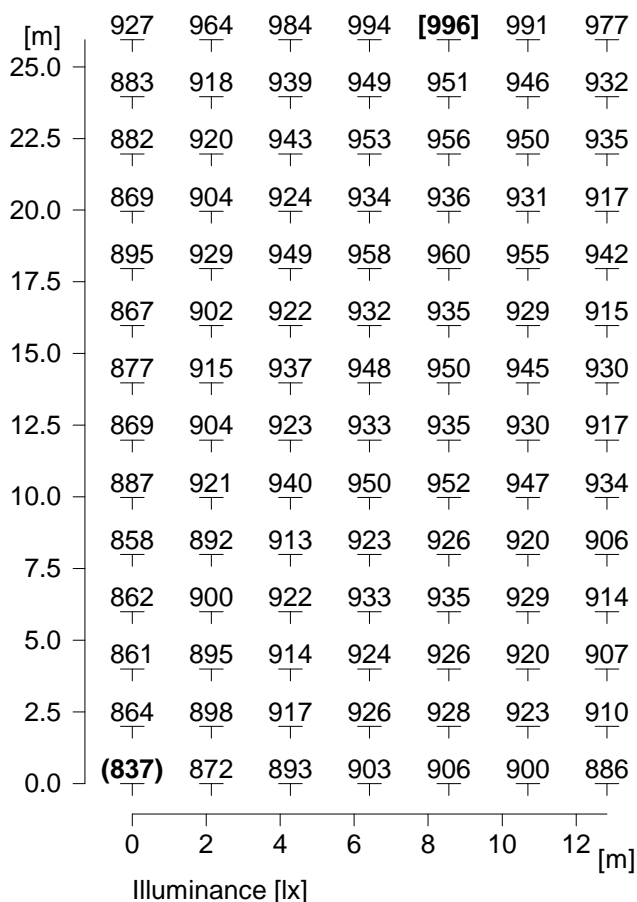
Average illuminance	Eav	: 0.03 m
Minimum illuminance	Emin	: 868 lx
Maximum illuminance	Emax	: 630 lx
Uniformity Uo	Emin/Eav	: 1 : 1.38 (0.73)
Diversity Ud	Emin/Emax	: 1 : 1.61 (0.62)

Object : TELOVADNICA VIŽMARJE  
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## 2.2 Calculation results, Room 1

### 2.2.3 Table, Reference plane 3.1 (E)



Average illuminance	Eav	: 922 lx
Minimum illuminance	Emin	: 837 lx
Maximum illuminance	Emax	: 996 lx
Uniformity Uo	Emin/Eav	: 1 : 1.10 (0.91)
Diversity Ud	Emin/Emax	: 1 : 1.19 (0.84)





# TELOVADNICA VIŽMARJE

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Object : TELOVADNICA VIŽMARJE  
Installation : EDUCATION AND SCIENCE  
Project number : 421/17  
Date : 17.08.2017

## 1 Luminaire data

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

#### 1.1.1 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

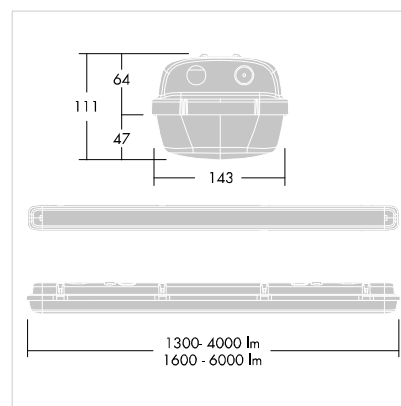
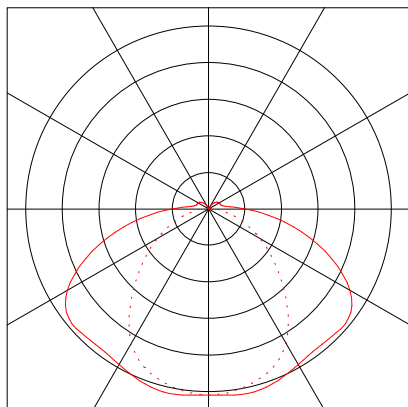
Luminaire efficacy : 120.75 lm/W  
Classification : A31 ↓93.0% ↑7.0%  
CIE Flux Codes : 39 69 90 93 100  
UGR 4H 8H : 25.3 / 20.4  
Power : 53 W  
Luminous flux : 6400 lm

#### **Equipped with**

Quantity : 1  
Designation :

Colour : 4000  
Colour reproduction : 80

Dimensions : 1600 mm x 147 mm x 118 mm



Object : TELOVADNICA VIŽMARJE  
Installation : EDUCATION AND SCIENCE  
Project number : 421/17  
Date : 17.08.2017



## 1 Luminaire data

### 1.2 Thorn, EQUAMINI L1180 LED2100-840 [STD] (22660812)

#### 1.2.1 Data sheet

Manufacturer: Thorn

#### 22660812 surface mounted EQUAMINI L1180 LED2100-840 [STD]

A slim surface mounted LED batten luminaire. Electronic, fixed output control gear. Class I electrical. IP20, IK06. Body: extruded aluminium anodised finish. Diffuser: opal polycarbonate plastic. End-cap: Dual-colour injected polycarbonate plastic. Electrical connection via flap in rear of body. Continuous linking possible. Complete with 4000K LED

Dimensions: 1180 x 37 x 60 mm

Total power: 18.3 W

Luminaire luminous flux: 2159 lm

Luminaire efficacy: 118 lm/W

Weight: 1.04 kg

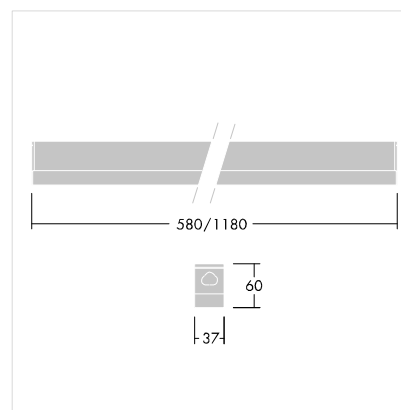
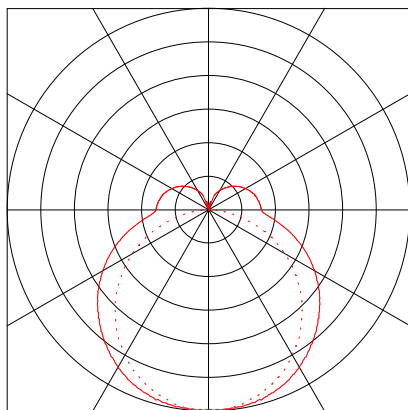
#### Luminaire data

Luminaire efficiency : 100%  
Luminaire efficacy : 120 lm/W  
Classification : B31 ↓83.5% ↑16.5%  
CIE Flux Codes : 40 70 90 84 98  
UGR 4H 8H : 27.6 / 23.9  
Power : 18.3 W  
Luminous flux : 2196 lm

#### Equipped with

Quantity : 1  
Designation :  
  
Power : 18 W  
Colour :  
Luminous flux : 2196 lm  
Colour reproduction : 80

Dimensions : 1180 mm x 37 mm x 60 mm



Object : TELOVADNICA VIŽMARJE  
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Project number : 421/17  
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## 1 Luminaire data

### 1.3 Zumtobel, SLOIN slim SL LED6600-840 LDE L... (42183893)

#### 1.3.1 Data sheet

Manufacturer: Zumtobel

#### 42183893 Surface-Suspended-Recessed SLOIN slim SL LED6600-840 LDE L4004 PC [STD]

DALI-dimmable LED light line with LED converter; with cover to 42m from one piece; 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: 6500 lm, Luminaire efficacy: 74 lm/W. Colour rendering Ra > 80, colour temperature 4000 K. Luminaire of aluminium, silver powder coated. Luminaire with completely uniform appearance due to polycarbonate cover. Luminaire consists of housing and continuous optic of polycarbonate. Includes gear tray, wiring, and end-cap set. Luminaire wired with halogen-free leads. Degree of protection: IP20 below (IP40 above) when recessed / IP20 with surface-mount/pendant. Dimensions: 4004 x 45 x 64 mm weight: 10.4 kg

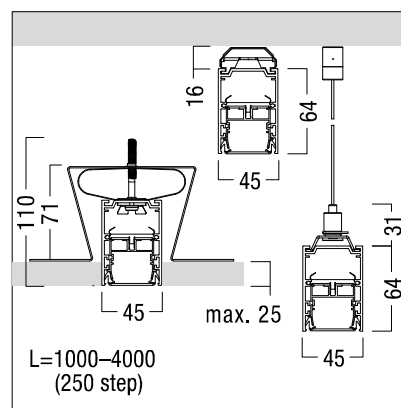
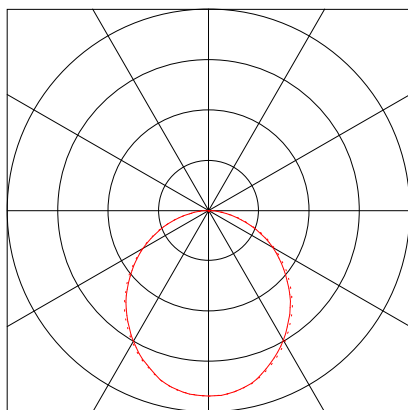
#### Luminaire data

Absolute Photometry  
Luminaire efficacy : 74.37 lm/W  
Classification : A40 ↓100.0% ↑0.0%  
CIE Flux Codes : 48 79 96 100 100  
UGR 4H 8H : 25.0 / 25.3  
Power : 87.4 W  
Luminous flux : 6500 lm

#### Equipped with

Quantity : 1  
Designation : LED-Z42183893  
Colour : Unknown  
Colour reproduction : 80

Dimensions : 4004 mm x 45 mm x 64 mm



Object : TELOVADNICA VIŽMARJE  
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Project number : 421/17  
Date : 17.08.2017



## 1 Luminaire data

### 1.4 Zumtobel, SLOIN slim SL LED5000-840 LDE L... (42183889)

#### 1.4.1 Data sheet

Manufacturer: Zumtobel

#### 42183889 Surface-Suspended-Recessed SLOIN slim SL LED5000-840 LDE L3004 PC [STD]

DALI-dimmable LED light line with LED converter; with cover to 42m from one piece; 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: 4880 lm, Luminaire efficacy: 71 lm/W. Colour rendering Ra > 80, colour temperature 4000 K. Luminaire of aluminium, silver powder coated. Luminaire with completely uniform appearance due to polycarbonate cover. Luminaire consists of housing and continuous optic of polycarbonate. Includes gear tray, wiring, and end-cap set. Luminaire wired with halogen-free leads. Degree of protection: IP20 below (IP40 above) when recessed / IP20 with surface-mount/pendant. Dimensions: 3004 x 45 x 64 mm weight: 7.6 kg

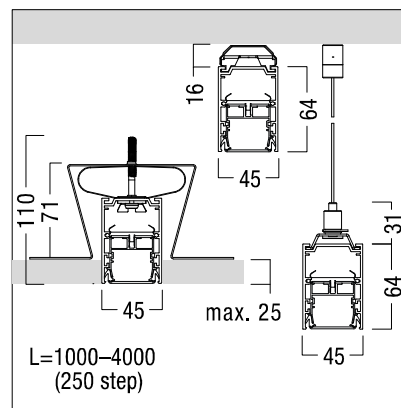
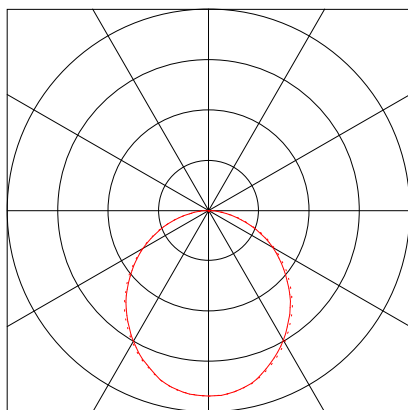
#### Luminaire data

Absolute Photometry  
Luminaire efficacy : 71.14 lm/W  
Classification : A40 ↓100.0% ↑0.0%  
CIE Flux Codes : 48 79 96 100 100  
UGR 4H 8H : 25.0 / 25.3  
Power : 68.6 W  
Luminous flux : 4880 lm

#### Equipped with

Quantity : 1  
Designation : LED-Z42183889  
Colour : Unknown  
Colour reproduction : 80

Dimensions : 3004 mm x 45 mm x 64 mm



Object : TELOVADNICA VIŽMARJE  
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## 1 Luminaire data

### 1.5 Zumtobel, SLOIN slim SL LED3800-840 LDE L... (42183886)

#### 1.5.1 Data sheet

Manufacturer: Zumtobel

#### 42183886 Surface-Suspended-Recessed SLOIN slim SL LED3800-840 LDE L2254 PC [STD]

DALI-dimmable LED light line with LED converter; with cover to 42m from one piece; 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: 3660 lm, Luminaire efficacy: 70 lm/W. Colour rendering Ra > 80, colour temperature 4000 K. Luminaire of aluminium, silver powder coated. Luminaire with completely uniform appearance due to polycarbonate cover. Luminaire consists of housing and continuous optic of polycarbonate. Includes gear tray, wiring, and end-cap set. Luminaire wired with halogen-free leads. Degree of protection: IP20 below (IP40 above) when recessed / IP20 with surface-mount/pendant. Dimensions: 2254 x 45 x 64 mm weight: 5.5 kg

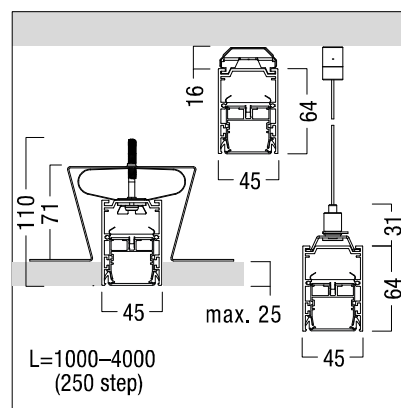
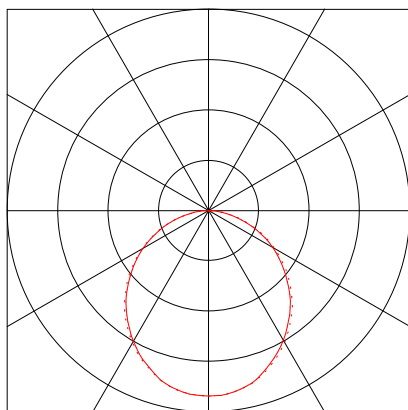
#### Luminaire data

Absolute Photometry  
 Luminaire efficacy : 69.98 lm/W  
 Classification : A40 ↓100.0% ↑0.0%  
 CIE Flux Codes : 48 79 96 100 100  
 UGR 4H 8H : 25.0 / 25.3  
 Power : 52.3 W  
 Luminous flux : 3660 lm

#### Equipped with

Quantity : 1  
 Designation : LED-Z42183886  
 Colour : Unknown  
 Colour reproduction : 80

Dimensions : 2254 mm x 45 mm x 64 mm



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## 1 Luminaire data

### 1.6 Zumtobel, TECTON C LED7400-840 L2000 WB L... (42183307)

#### 1.6.1 Data sheet

Manufacturer: Zumtobel

#### 42183307 Surface-mounted suspended TECTON C LED7400-840 L2000 WB LDE WH [STD]

Linear, energy-efficient TECTON LED continuous-row luminaire with 64 highly efficient mid-power LEDs per segment. Total power: 44.4 W, DALI controllable luminaire with LED converter, makes environmental and financial sense. LED service life lasts 50000 h before luminous flux is reduced to 90% of the initial value. Chromaticity tolerance (initial MacAdam): 3. Luminaire efficacy: 167 lm/W. Luminaire luminous flux: 7430 lm. Luminaire with symmetric wide light distribution (wide beam). Colour rendering Ra > 80, colour temperature 4000 K. Split lens concept for reducing perceived glare. Overlapping PMMA lenses (shatter-resistant to IK07) achieve IP50 protection for LED and optic. All-in-one solution: lighting batten, lamp and reflector are combined in one product to produce a 100 % continuous ribbon of LED light without gaps. High-quality look in a design that matches the trunking. Dimming level for DC mode preset to 15 %. LED continuous-row luminaire of sheet steel, enamelled in polyester lacquer finish, white. 100% flexible, tool-free mechanical and electrical installation using CLIX-technology by means of two side-mounted rotary levers on the TECTON trunking. No ultraviolet or infrared radiation. ambient temperature: -20°C to +40°C 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. Dimensions: 1997 x 60 x 85 mm. Weight: 2.8 kg.

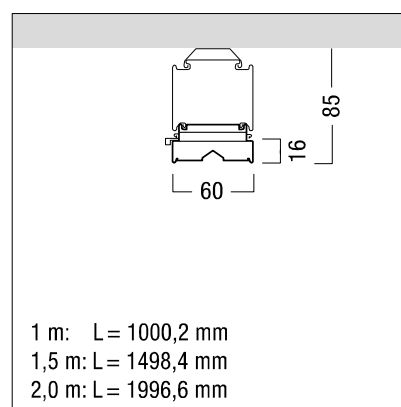
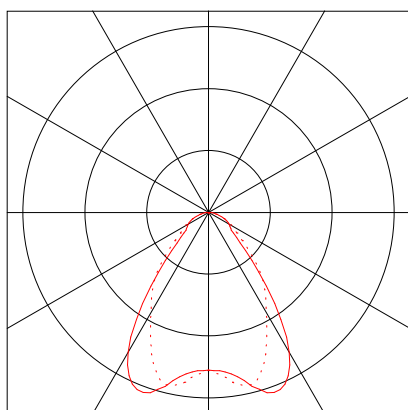
#### Luminaire data

Absolute Photometry  
Luminaire efficacy : 167.34 lm/W  
Classification : A50 ↓99.9% ↑0.1%  
CIE Flux Codes : 69 91 98 100 100  
UGR 4H 8H : 22.4 / 22.3  
Power : 44.4 W  
Luminous flux : 7430 lm

#### Equipped with

Quantity : 1  
Designation : LED-Z42183307  
Colour : Unknown  
Colour reproduction : 80

Dimensions : 1997 mm x 60 mm x 85 mm

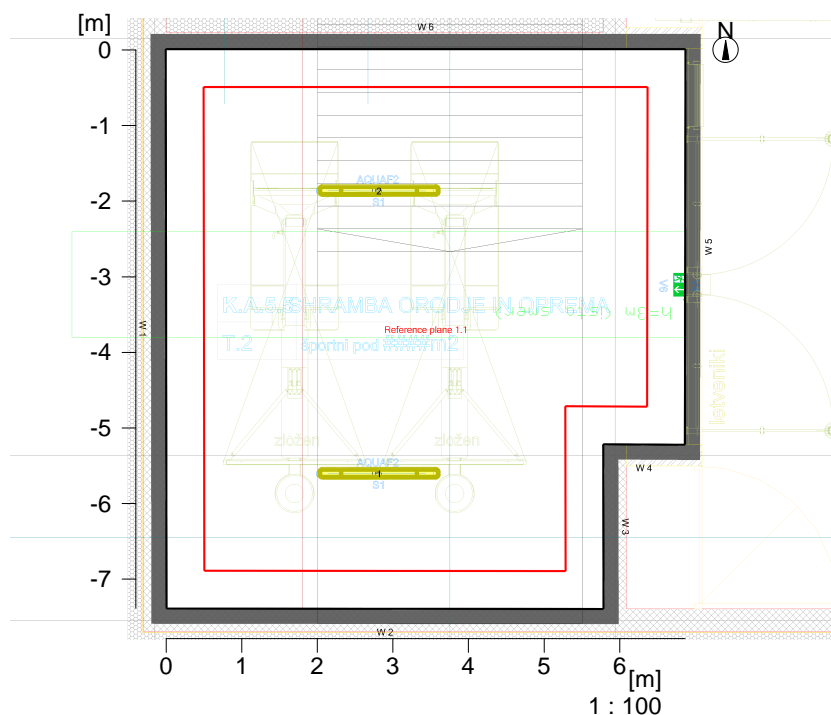


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## 2 Room 1

### 2.1 Description, Room 1

#### 2.1.1 Floor plan



Wall	x	y	Length	Reflectance
1	12.64 m	50.02 m	7.38 m	50.0 %
2	18.41 m	50.01 m	5.77 m	50.0 %
3	18.41 m	52.19 m	2.17 m	50.0 %
4	19.49 m	52.18 m	1.08 m	50.0 %
5	19.50 m	57.40 m	5.22 m	50.0 %
6	12.63 m	57.40 m	6.86 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		3.58 m		
Height of reference plane		0.75 m		

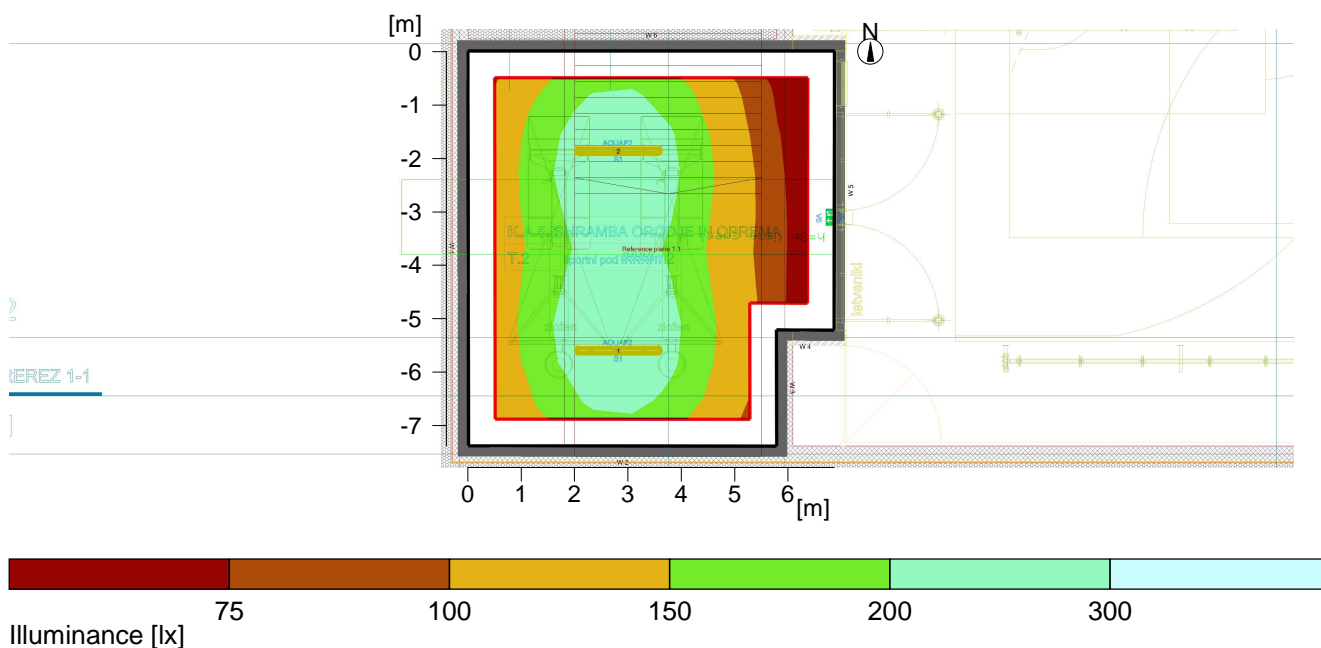


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## 2 Room 1

### 2.2 Summary, Room 1

#### 2.2.1 Result overview, Evaluation area 1



#### General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	3.58 m
Maintenance factor	0.80
Total luminous flux of all lamps	12800 lm
Total power	106.0 W
Total power per area (48.27 m <sup>2</sup> )	2.20 W/m <sup>2</sup> (1.37 W/m <sup>2</sup> /100lx)

#### Evaluation area 1

#### Reference plane 1.1

	Horizontal
Em	160 lx
Emin	61 lx
Emin/Eav (Uo)	0.38
Emin/Emax (Ud)	0.26
UGR (3.2H 3.0H)	<=22.5
Position	0.75 m

#### Type No. Make

1	2	<b>Thorn</b>
		Order No. : 96241871
		Luminaire name : AQUAF2 LED 6400 HF L840 [STD]
		Equipment : 1 x LED_AQUL_6748 53 W / 6400 lm

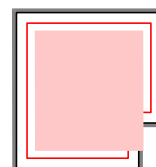
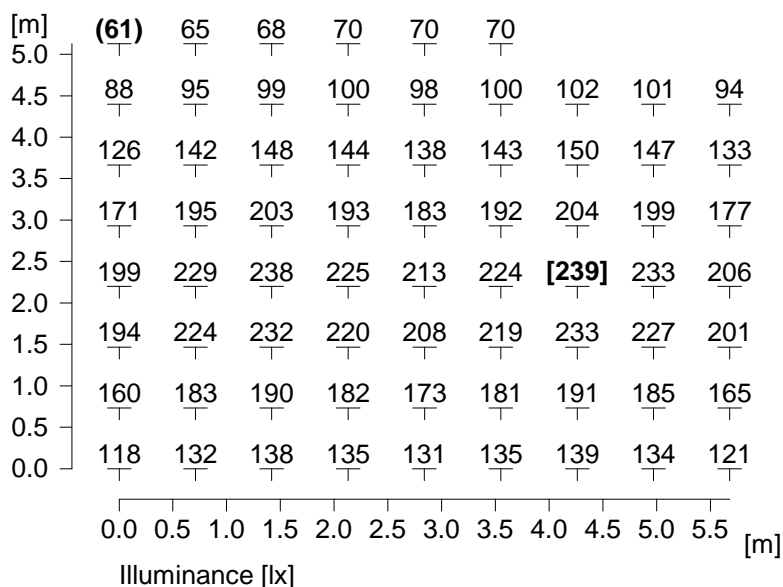
Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017



## 2 Room 1

### 2.3 Calculation results, Room 1

#### 2.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 160 lx
Maximum illuminance	Emax	: 61 lx
Uniformity Uo	Emin/Eav	: 239 lx
Diversity Ud	Emin/Emax	: 1 : 2.60 (0.38)
		: 1 : 3.89 (0.26)

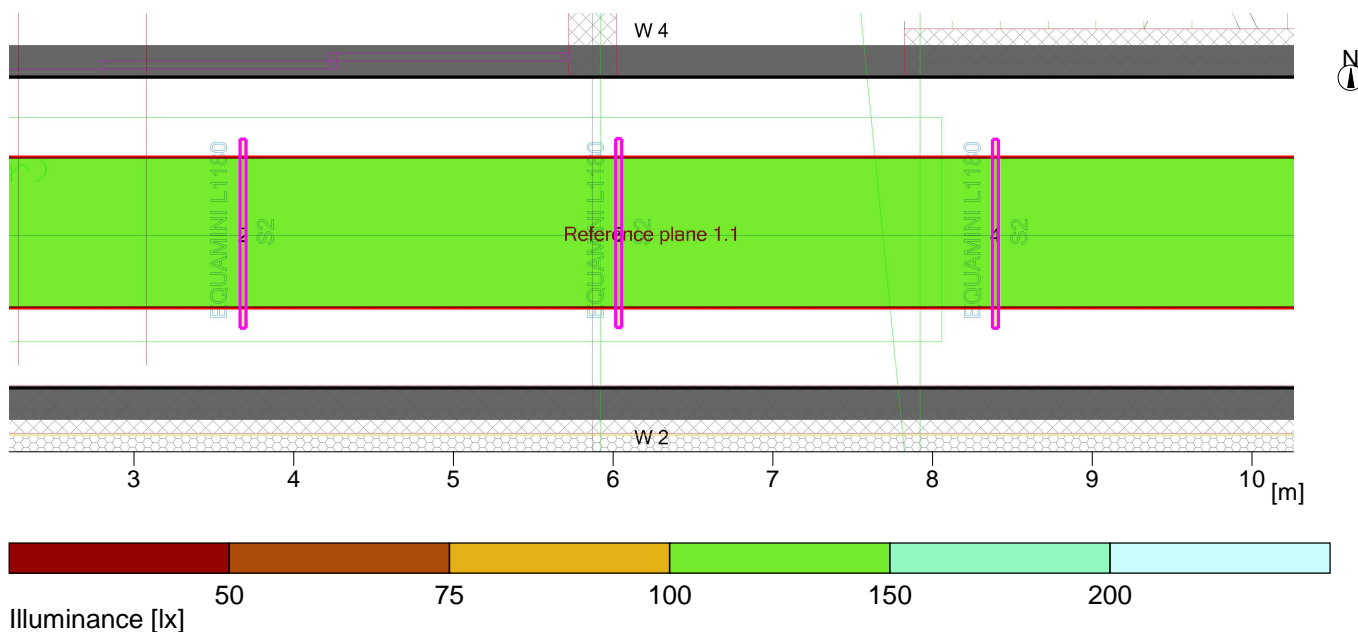
Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017



### 3 Room 2

#### 3.1 Summary, Room 2

##### 3.1.1 Result overview, Evaluation area 1



#### General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	3.58 m
Maintenance factor	0.80
Total luminous flux of all lamps	10980 lm
Total power	91.5 W
Total power per area (24.23 m <sup>2</sup> )	3.78 W/m <sup>2</sup> (3.34 W/m <sup>2</sup> /100lx)

#### Evaluation area 1

#### Reference plane 1.1

User profile: Educational premises - Educational buildings  
 5.36.17 (EN 12464-1, 8.2011) Circulation areas, corridors (Ra >80.00)

	Horizontal
Em	113 lx (>= 100 lx)
Emin	80 lx
Emin/Eav (Uo)	0.71 (>= 0.40)
Emin/Emax (Ud)	0.64
UGR (0.8H 5.4H)	<=25.1 (< 25.00)
Position	0.03 m

#### Type No. Make

Object : TELOVADNICA VIŽMARJE  
Installation : EDUCATION AND SCIENCE  
Project number : 421/17  
Date : 17.08.2017



**ZUMTOBEL**

### **3 Room 2**

#### **3.1 Summary, Room 2**

##### **3.1.1 Result overview, Evaluation area 1**

2	5	<b>Thorn</b>	
		Order No.	: 22660812
		Luminaire name	: EQUAMINI L1180 LED2100-840 [STD]
		Equipment	: 1 x LED_EQUM_2196_HF 18 W / 2196 lm

Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017

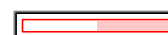


### 3 Room 2

#### 3.2 Calculation results, Room 2

##### 3.2.1 Table, Reference plane 1.1 (E)

	(80)	82	82	82	81
	84	86	86	86	85
11	89	90	90	90	89
	92	93	94	93	92
	95	97	98	97	96
	99	101	101	101	99
	102	103	104	104	102
10	104	106	106	106	104
	106	108	109	108	107
	108	110	111	110	109
	110	112	113	112	111
	112	114	114	114	112
9	113	115	115	115	113
	114	116	116	116	114
	115	117	118	117	116
	116	118	118	118	116
	117	119	119	119	117
8	117	119	120	119	118
	118	120	120	120	118
	119	120	121	120	119
	119	121	121	121	119
	119	121	122	122	120
7	120	122	123	122	120
	120	122	122	122	120
	120	122	123	122	120
	121	122	123	122	121
	121	123	123	123	121
	121	123	124	123	121
6	121	123	124	123	122
	122	123	124	123	122



Part1

Height of the reference plane

		: 0.03 m
Average illuminance	Eav	: 113 lx
Minimum illuminance	Emin	: 80 lx
Maximum illuminance	Emax	: 124 lx
Uniformity Uo	Emin/Eav	: 1 : 1.41 (0.71)
Diversity Ud	Emin/Emax	: 1 : 1.55 (0.64)

Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017

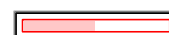


### 3 Room 2

#### 3.2 Calculation results, Room 2

##### 3.2.1 Table, Reference plane 1.1 (E)

	122	123	[124]	123	122
	122	[124]	[124]	[124]	122
	122	[124]	[124]	[124]	122
5	122	[124]	[124]	[124]	122
	122	[124]	[124]	[124]	122
	122	[124]	[124]	[124]	122
	122	[124]	[124]	[124]	122
	122	[124]	[124]	[124]	122
4	122	[124]	[124]	[124]	122
	121	123	[124]	123	121
	121	122	123	123	121
	120	122	123	122	121
	120	122	122	122	120
3	119	121	122	121	119
	119	120	121	120	119
	118	119	120	119	118
	117	118	119	118	117
	116	118	118	118	116
2	115	117	117	117	115
	113	115	116	115	113
	112	113	114	113	112
	110	112	112	112	110
	108	110	110	110	108
	106	108	108	108	106
1	103	105	106	105	103
	100	102	103	102	100
	97	99	99	99	97
	94	95	96	95	94
	90	92	92	92	90
0	87	88	89	88	87
	0.0	0.2	0.4	0.6	



Part2

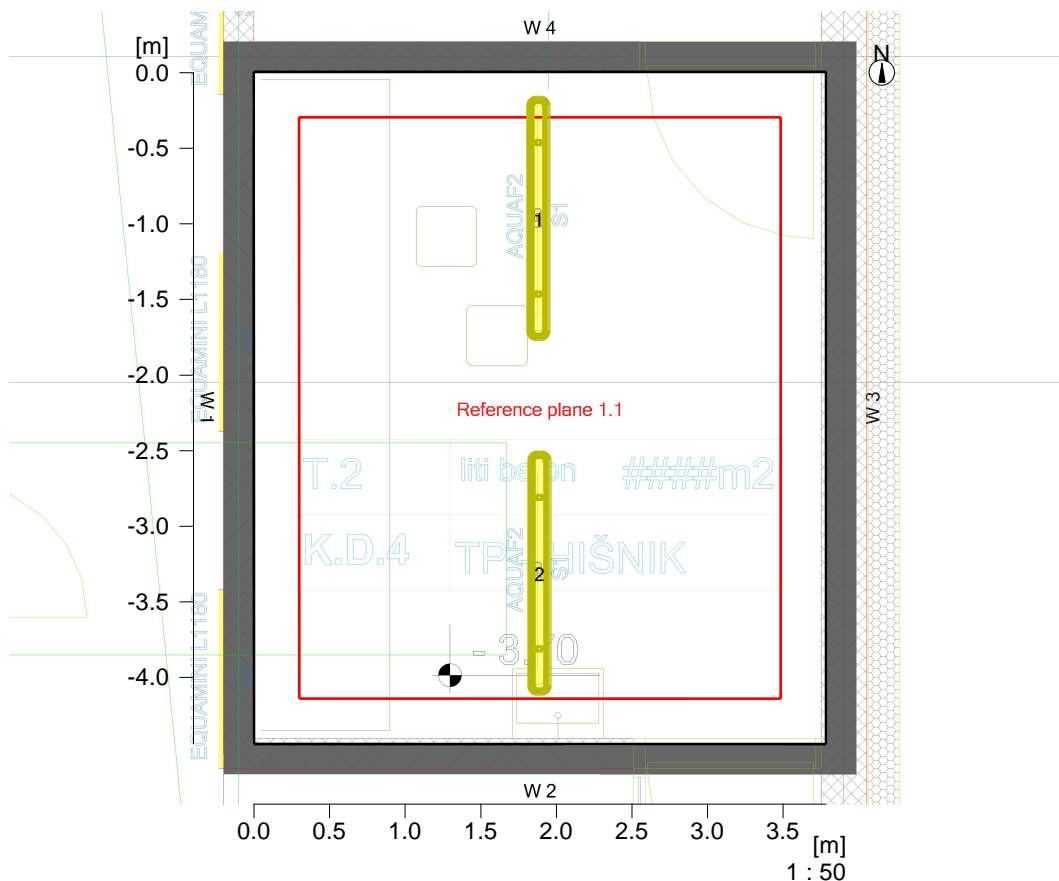
Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017



## 4 Room 3

### 4.1 Description, Room 3

#### 4.1.1 Floor plan



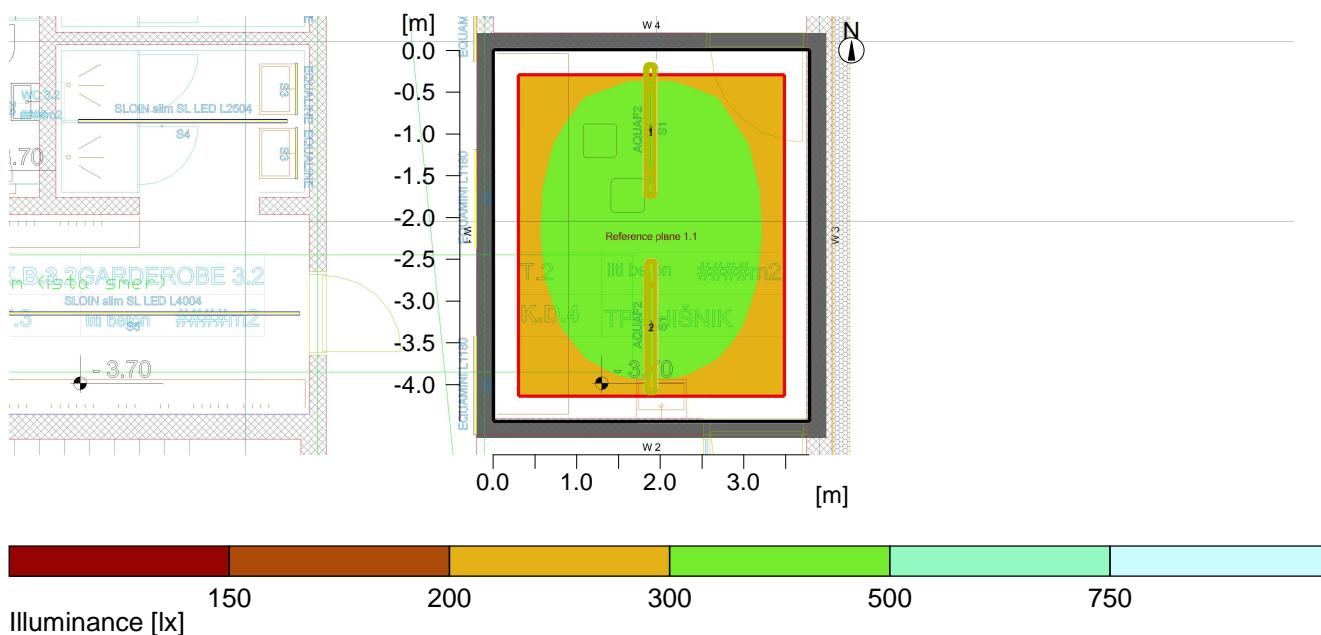
Wall	x	y	Length	Reflectance
1	64.25 m	14.40 m	4.44 m	50.0 %
2	68.03 m	14.40 m	3.78 m	50.0 %
3	68.03 m	18.84 m	4.44 m	50.0 %
4	64.25 m	18.84 m	3.78 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		3.58 m		
Height of reference plane		0.75 m		

Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017

## 4 Room 3

### 4.2 Summary, Room 3

#### 4.2.1 Result overview, Evaluation area 1



#### General

Calculation algorithm used  
 Height of luminaire plane  
 Maintenance factor

Average indirect fraction  
 3.45 m  
 0.80

Total luminous flux of all lamps  
 Total power  
 Total power per area (16.78 m<sup>2</sup>)

12800 lm  
 106.0 W  
 6.32 W/m<sup>2</sup> (2.08 W/m<sup>2</sup>/100lx)

#### Evaluation area 1

#### Reference plane 1.1

User profile: Educational premises - Educational buildings  
 5.36.20 (EN 12464-1, 8.2011) Teachers rooms (Ra >80.00)

Horizontal	
Em	303 lx ( $\geq 300$ lx)
Emin	235 lx
Emin/Eav (Uo)	0.78 ( $\geq 0.60$ )
Emin/Emax (Ud)	0.66
UGR (1.7H 2.0H)	$\leq 19.9$ ( $< 19.00$ )
Position	0.75 m

Type No.\Make



Object : TELOVADNICA VIŽMARJE  
Installation : EDUCATION AND SCIENCE  
Project number : 421/17  
Date : 17.08.2017




**ZUMTOBEL**

## **4 Room 3**

### **4.2 Summary, Room 3**

#### **4.2.1 Result overview, Evaluation area 1**

		Thorn	
1	2	Order No.	: 96241871
		Luminaire name	: AQUAF2 LED 6400 HF L840 [STD]
		Equipment	: 1 x LED_AQUL_6748 53 W / 6400 lm

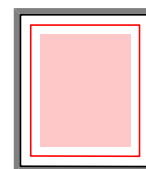
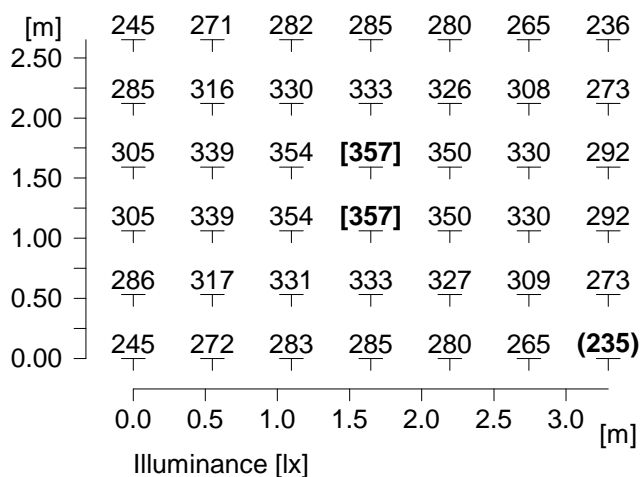
Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017



## 4 Room 3

### 4.3 Calculation results, Room 3

#### 4.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

Average illuminance	Eav	: 0.75 m	: 303 lx
Minimum illuminance	Emin	: 235 lx	
Maximum illuminance	Emax	: 357 lx	
Uniformity Uo	Emin/Eav	: 1 : 1.29 (0.78)	
Diversity Ud	Emin/Emax	: 1 : 1.52 (0.66)	

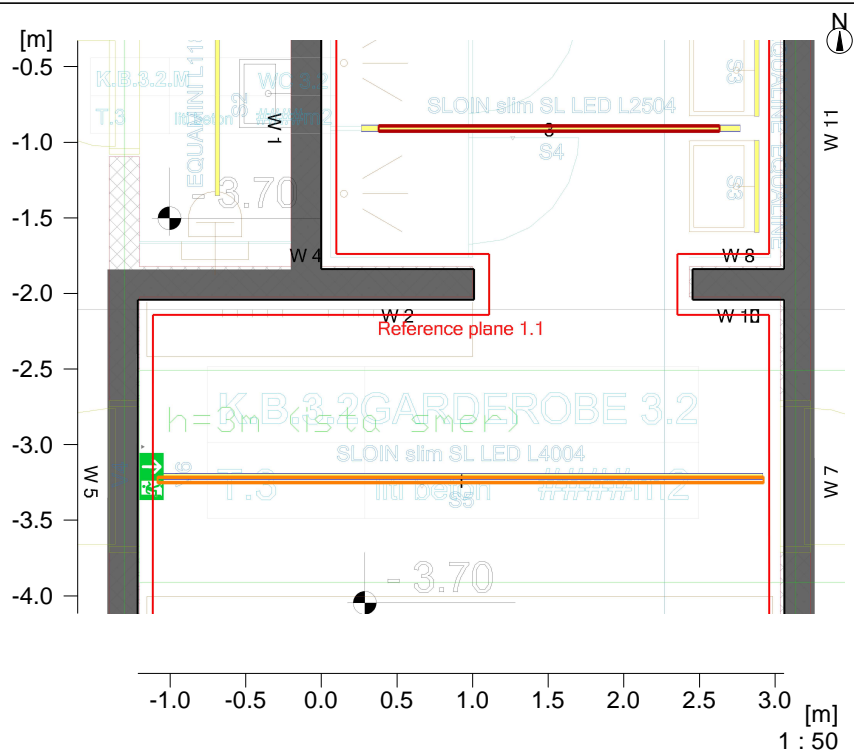
Object : TELOVADNICA VIŽMARJE  
Installation : EDUCATION AND SCIENCE  
Project number : 421/17  
Date : 17.08.2017



## 5 Room 4

### 5.1 Description, Room 4

#### 5.1.1 Floor plan



Object : TELOVADNICA VIŽMARJE  
Installation : EDUCATION AND SCIENCE  
Project number : 421/17  
Date : 17.08.2017



**ZUMTOBEL**

## 5 Room 4

### 5.1 Description, Room 4

#### 5.1.1 Floor plan

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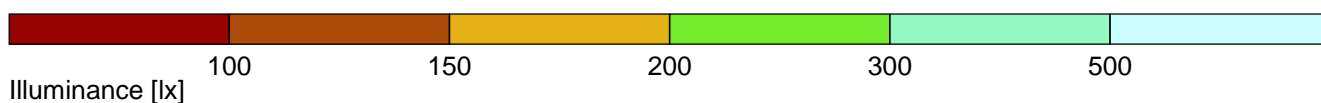
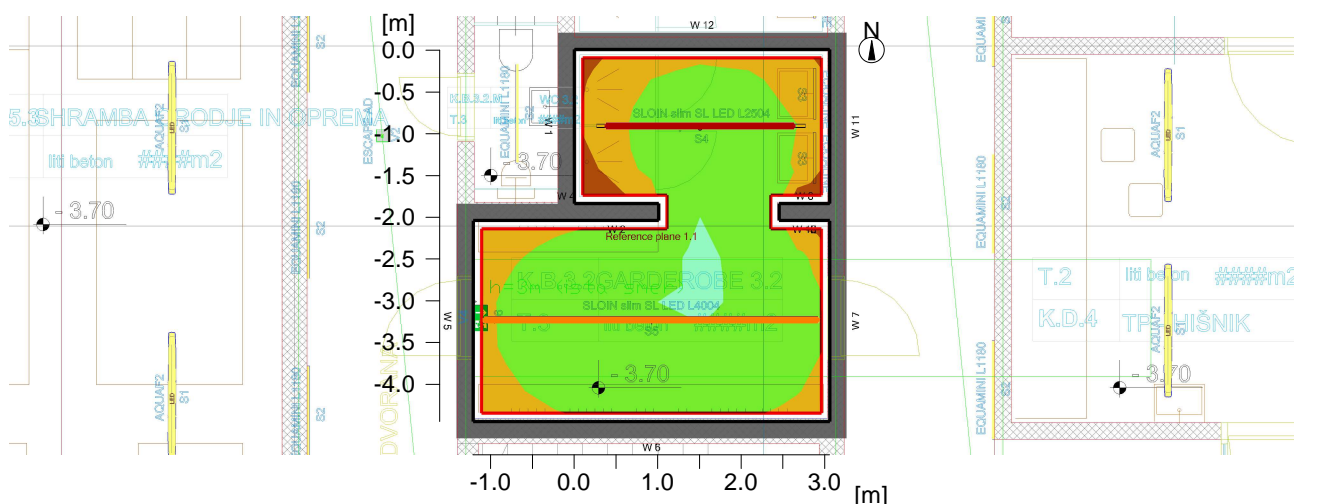
Wall	x	y	Length	Reflectance
1	58.97 m	17.05 m	1.84 m	50.0 %
2	59.98 m	17.05 m	1.01 m	50.0 %
3	59.98 m	16.85 m	0.20 m	50.0 %
4	57.76 m	16.85 m	2.22 m	50.0 %
5	57.76 m	14.45 m	2.40 m	50.0 %
6	62.03 m	14.45 m	4.27 m	50.0 %
7	62.03 m	16.85 m	2.40 m	50.0 %
8	61.42 m	16.85 m	0.61 m	50.0 %
9	61.42 m	17.05 m	0.20 m	50.0 %
10	62.03 m	17.05 m	0.61 m	50.0 %
11	62.03 m	18.90 m	1.84 m	50.0 %
12	58.97 m	18.90 m	3.06 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		3.58 m		
Height of reference plane		0.75 m		

Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017

## 5 Room 4

### 5.2 Summary, Room 4

#### 5.2.1 Result overview, Evaluation area 1



#### General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	3.50 m
Maintenance factor	0.80
Total luminous flux of all lamps	10160 lm
Total power	139.7 W
Total power per area (16.17 m <sup>2</sup> )	8.64 W/m <sup>2</sup> (3.80 W/m <sup>2</sup> /100lx)

#### Evaluation area 1

#### Reference plane 1.1

User profile: General areas inside buildings - Rest, sanitation and first aid rooms  
 5.2.4 (EN 12464-1, 8.2011) Cloakrooms, washrooms, bathrooms, toilets (Ra >80.00)

Horizontal	
Em	227 lx ( $\geq 200$ lx)
Emin	146 lx
Emin/Eav (Uo)	0.64 ( $\geq 0.40$ )
Emin/Emax (Ud)	0.50
Position	0.75 m

#### Type No.\Make

Object : TELOVADNICA VIŽMARJE  
Installation : EDUCATION AND SCIENCE  
Project number : 421/17  
Date : 17.08.2017



**ZUMTOBEL**

## 5 Room 4

### 5.2 Summary, Room 4

#### 5.2.1 Result overview, Evaluation area 1

		<b>Zumtobel</b>	
<hr/>	3	1	Order No. : 42183893
			Luminaire name : SLOIN slim SL LED6600-840 LDE L4004 PC [STD]
			Equipment : 1 x LED-Z42183893 87 W / 6500 lm
<hr/>	5	1	Order No. : 42183886
			Luminaire name : SLOIN slim SL LED3800-840 LDE L2254 PC [STD]
			Equipment : 1 x LED-Z42183886 52 W / 3660 lm

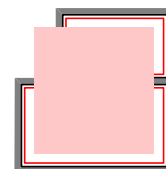
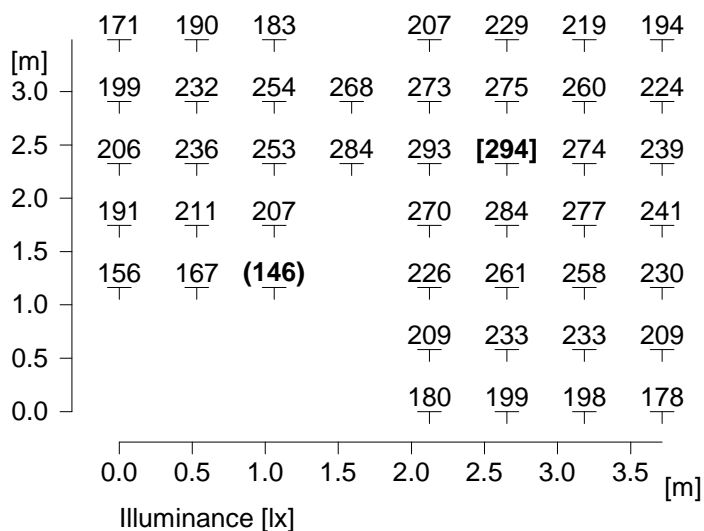
Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017



## 5 Room 4

### 5.3 Calculation results, Room 4

#### 5.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

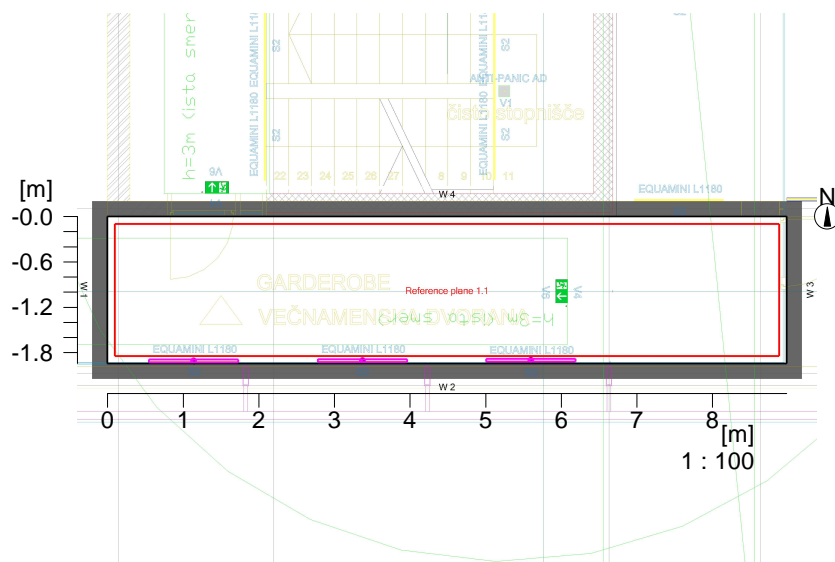
Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 227 lx
Maximum illuminance	Emax	: 146 lx
Uniformity Uo	Emin/Eav	: 294 lx
Diversity Ud	Emin/Emax	: 1 : 1.56 (0.64)
		: 1 : 2.01 (0.50)

Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017

## 6 Room 5

### 6.1 Description, Room 5

#### 6.1.1 Floor plan



Wall	x	y	Length	Reflectance
1	55.44 m	137.27 m	1.94 m	70.0 %
2	64.42 m	137.27 m	8.98 m	70.0 %
3	64.42 m	139.21 m	1.94 m	70.0 %
4	55.44 m	139.21 m	8.98 m	70.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.03 m		

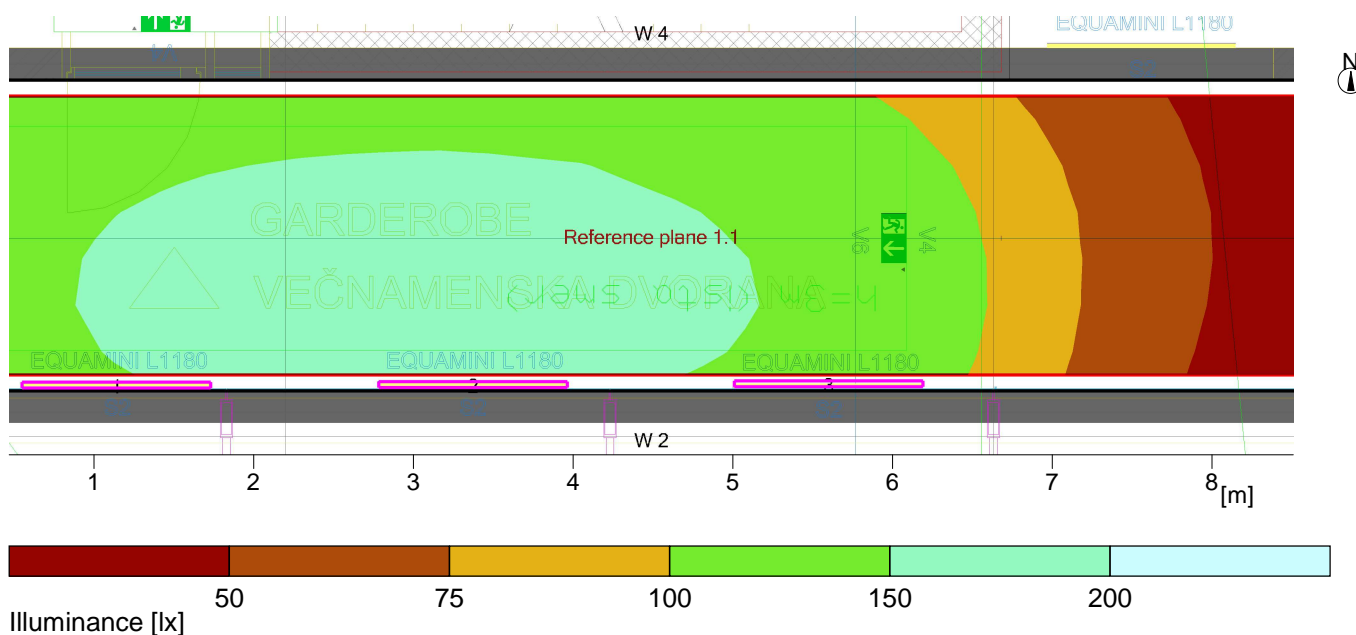


Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017

## 6 Room 5

### 6.2 Summary, Room 5

#### 6.2.1 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 (17.43 m<sup>2</sup>)

6588 lm  
 54.9 W  
 3.15 W/m<sup>2</sup> (2.72 W/m<sup>2</sup>/100lx)

#### Evaluation area 1

#### Reference plane 1.1

Horizontal  
 Em 116 lx  
 Emin 34 lx  
 Emin/Eav (Uo) 0.29  
 Emin/Emax (Ud) 0.21  
 UGR (1.3H 6.2H) <=25.6  
 Position 0.03 m

#### Type No. Make

2	3	<b>Thorn</b>
		Order No. : 22660812
		Luminaire name : EQUAMINI L1180 LED2100-840 [STD]
		Equipment : 1 x LED_EQUM_2196_HF 18 W / 2196 lm

Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017

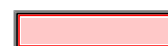


## 6 Room 5

### 6.3 Calculation results, Room 5

#### 6.3.1 Table, Reference plane 1.1 (E)

	(34)	35	36	36	36	(34)
	37	38	39	39	39	37
8	41	43	44	44	44	42
	46	49	50	51	50	48
	53	56	58	59	58	56
7	60	65	67	68	68	66
	69	74	77	79	79	77
	77	84	89	91	91	89
	86	94	100	103	104	101
6	95	104	111	115	116	113
	103	113	120	125	126	123
	110	121	129	134	135	132
5	116	127	135	140	142	138
	120	133	141	146	147	143
	124	136	145	150	151	147
4	127	140	148	153	154	151
	130	143	151	157	158	154
	132	145	154	159	160	157
	133	146	155	161	[162]	158
3	134	147	156	161	[162]	159
	133	146	156	161	[162]	158
	133	146	155	160	161	157
2	132	145	153	158	159	155
	130	143	152	157	158	154
	128	141	150	155	156	152
	125	138	146	152	153	149
1	121	133	142	147	148	144
	116	128	136	140	141	137
	109	120	127	131	132	128
0	100	109	115	119	120	116



Height of the reference plane

		: 0.03 m
Average illuminance	Eav	: 116 lx
Minimum illuminance	Emin	: 34 lx
Maximum illuminance	Emax	: 162 lx
Uniformity Uo	Emin/Eav	: 1 : 3.40 (0.29)
Diversity Ud	Emin/Emax	: 1 : 4.78 (0.21)

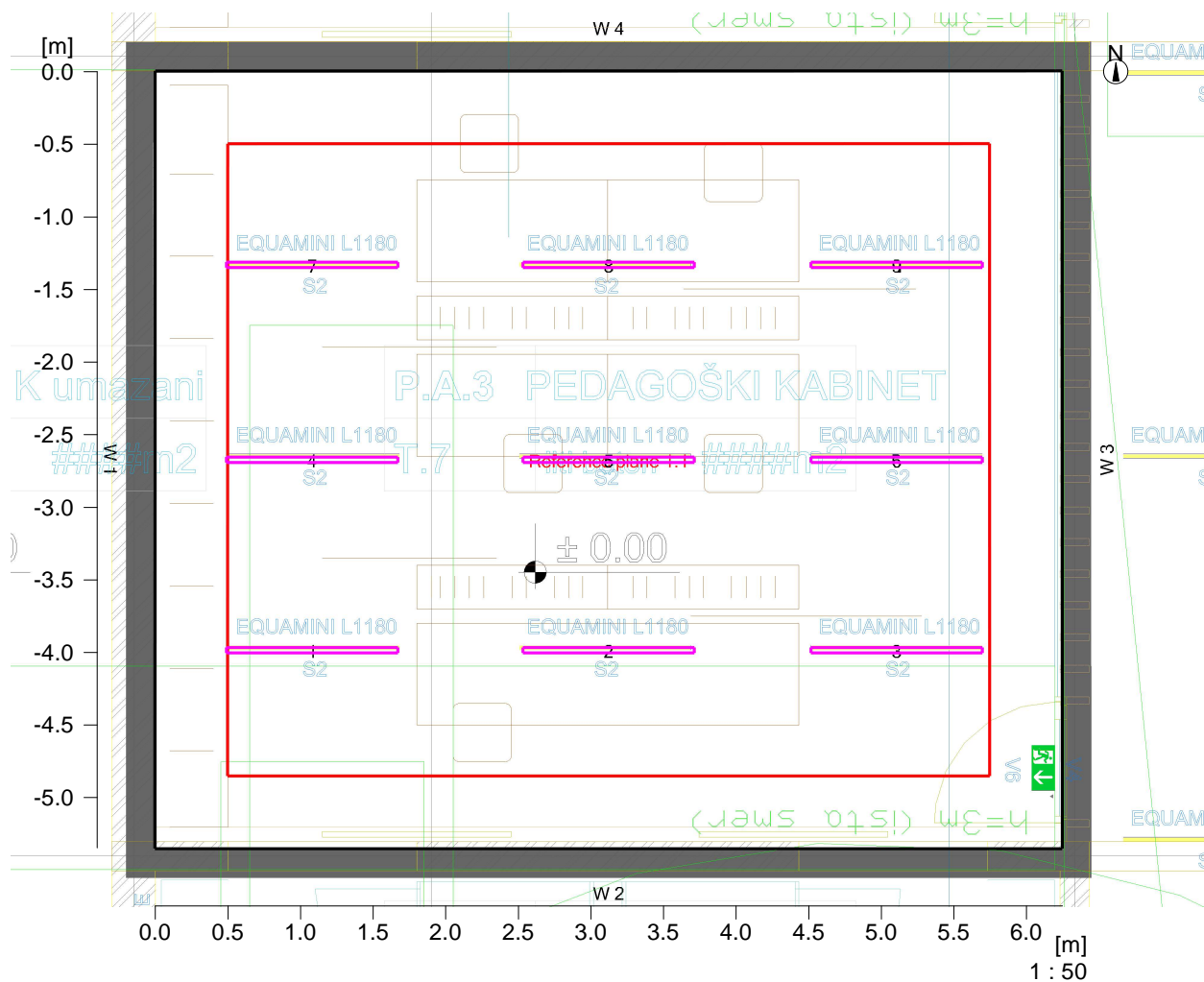
Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017



## 7 Room 6

### 7.1 Description, Room 6

#### 7.1.1 Floor plan



Wall	x	y	Length	Reflectance
1	55.74 m	147.13 m	5.35 m	50.0 %
2	61.99 m	147.13 m	6.25 m	50.0 %
3	61.99 m	152.47 m	5.35 m	50.0 %
4	55.74 m	152.47 m	6.24 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.75 m		

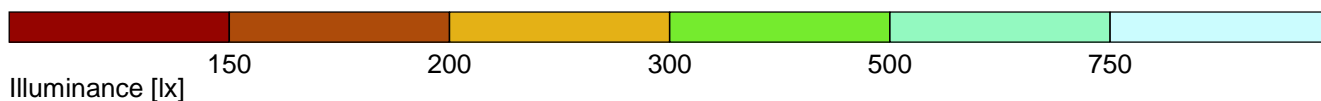
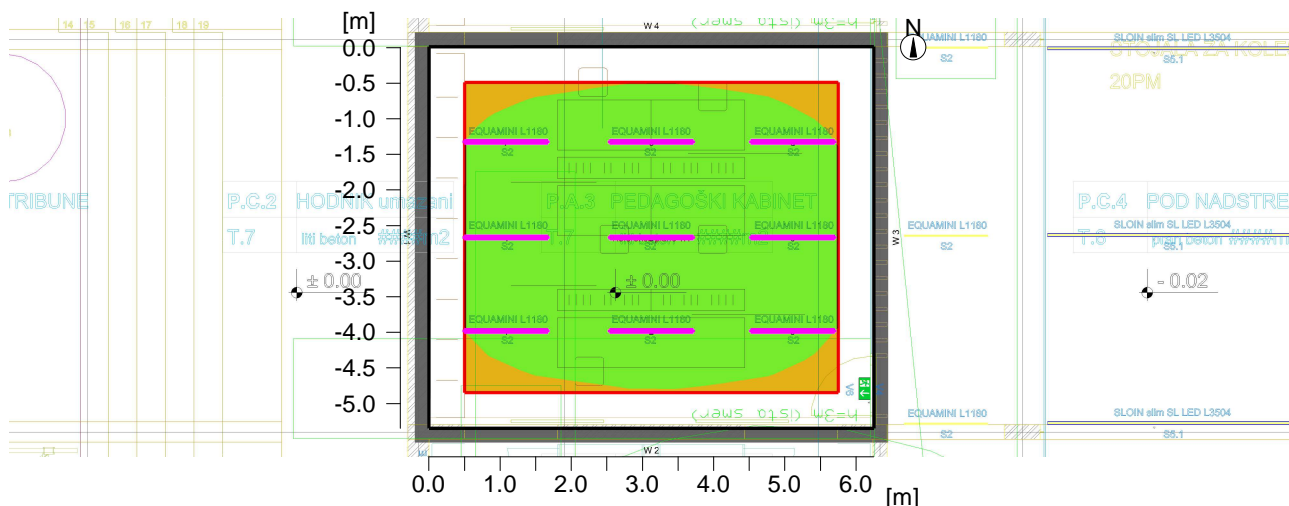
ZG Lighting d.o.o., Štukljeva cesta 46, SI - 1000 Ljubljana  
 Simon Vovk, B.A. Design, Lighting Designer Adriatic region

Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017

## 7 Room 6

### 7.2 Summary, Room 6

#### 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	19764 lm
Total power	164.7 W
Total power per area (33.40 m²)	4.93 W/m² (1.37 W/m²/100lx)

#### Evaluation area 1

#### Reference plane 1.1

User profile: Educational premises - Educational buildings  
 5.36.20 (EN 12464-1, 8.2011) Teachers rooms (Ra >80.00)

	Horizontal
Em	359 lx (>= 300 lx)
Emin	263 lx
Emin/Eav (Uo)	0.73 (>= 0.60)
Emin/Emax (Ud)	0.60
UGR (3.7H 4.3H)	<=25.9 (< 19.00)
Position	0.75 m

Type No.\Make

Object : TELOVADNICA VIŽMARJE  
Installation : EDUCATION AND SCIENCE  
Project number : 421/17  
Date : 17.08.2017



**ZUMTOBEL**

## **7 Room 6**

### **7.2 Summary, Room 6**

#### **7.2.1 Result overview, Evaluation area 1**

2	9	<b>Thorn</b>	
		Order No.	: 22660812
		Luminaire name	: EQUAMINI L1180 LED2100-840 [STD]
		Equipment	: 1 x LED_EQUM_2196_HF 18 W / 2196 lm

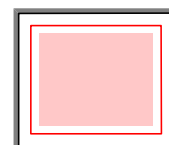
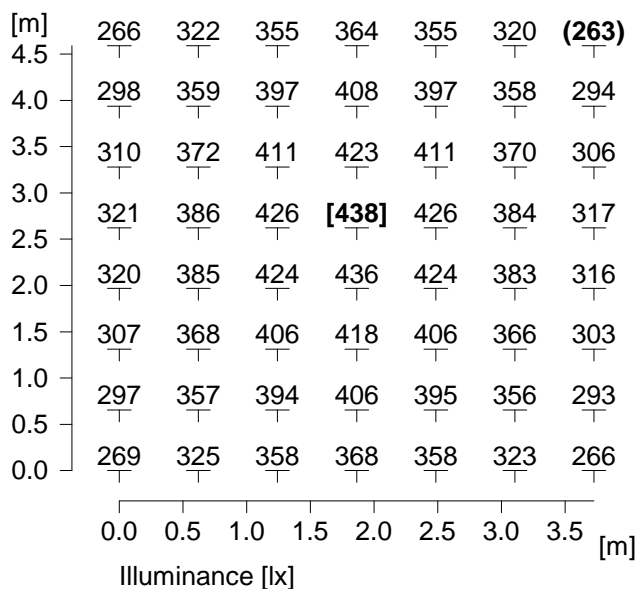
Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017



## 7 Room 6

### 7.3 Calculation results, Room 6

#### 7.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 359 lx
Maximum illuminance	Emax	: 263 lx
Uniformity Uo	Emin/Eav	: 438 lx
Diversity Ud	Emin/Emax	: 1 : 1.36 (0.73)
		: 1 : 1.67 (0.60)



### 8.1.1 Floor plan

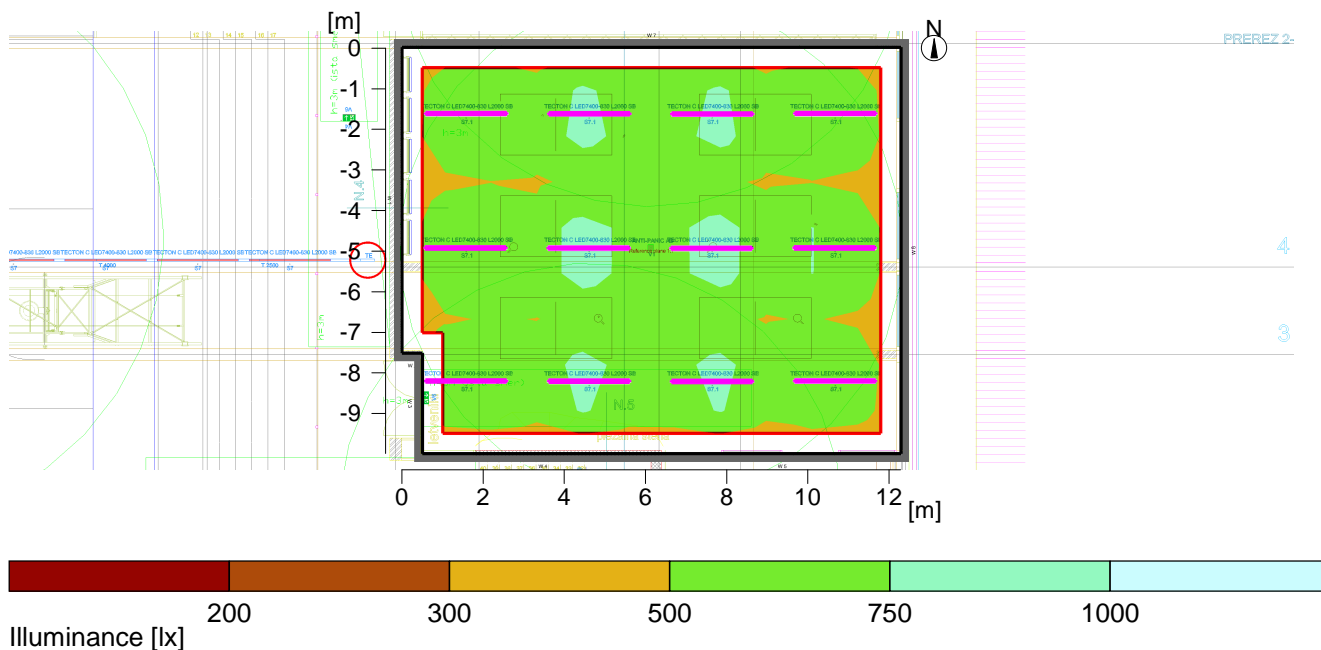
Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017



## 8 Room 7

### 8.2 Summary, Room 7

#### 8.2.1 Result overview, Evaluation area 1



#### General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.92 m
Maintenance factor	0.80
Total luminous flux of all lamps	89160 lm
Total power	532.8 W
Total power per area (121.43 m²)	4.39 W/m² (0.71 W/m²/100lx)

#### Evaluation area 1

#### Reference plane 1.1

Horizontal	
Em	621 lx
Emin	416 lx
Emin/Eav (Uo)	0.67
Emin/Emax (Ud)	0.52
UGR (6.1H 7.5H)	<=22.5
Position	0.75 m

#### Type No. Make

6	12	<b>Zumtobel</b>	
		Order No.	: 42183307
		Luminaire name	: TECTON C LED7400-840 L2000 WB LDE WH [STD]
		Equipment	: 1 x LED-Z42183307 44 W / 7430 lm



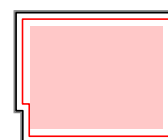
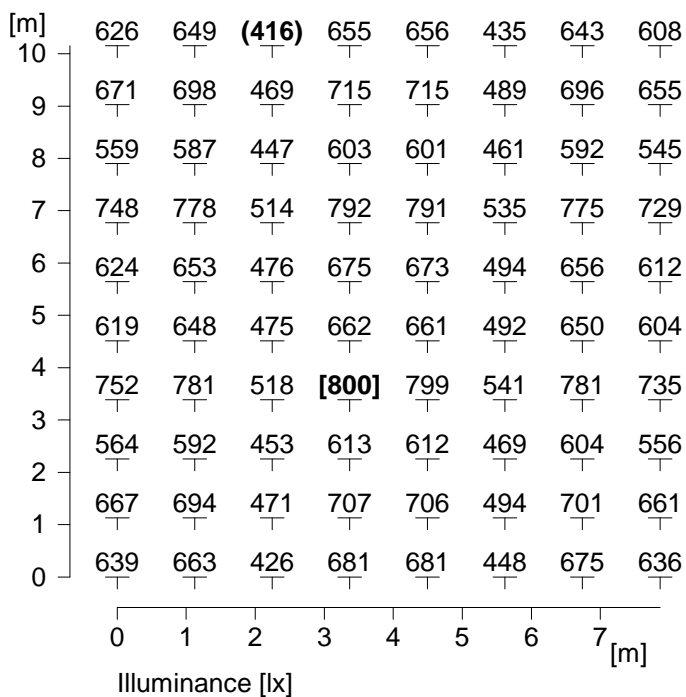
Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 421/17  
 Date : 17.08.2017



## 8 Room 7

### 8.3 Calculation results, Room 7

#### 8.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 621 lx
Maximum illuminance	Emax	: 416 lx
Uniformity Uo	Emin/Eav	: 800 lx
Diversity Ud	Emin/Emax	: 1 : 1.49 (0.67)
		: 1 : 1.92 (0.52)



# TELOVADNICA VIŽMARJE

Installation : EDUCATION AND SCIENCE

Project number : 422/17

Customer : MEDPROSTOR

Processed by : ZUMTOBEL

Date : 23.08.2017

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 : TELOVADNICA VIŽMARJE  
Installation : EDUCATION AND SCIENCE  
Project number : 422/17  
Date : 23.08.2017



## 1 Luminaire data

### 1.1 Thorn, EQUAMINI L1180 LED2100-840 [STD] (22660812)

#### 1.1.1 Data sheet

Manufacturer: Thorn

#### 22660812 surface mounted EQUAMINI L1180 LED2100-840 [STD]

A slim surface mounted LED batten luminaire. Electronic, fixed output control gear. Class I electrical. IP20, IK06. Body: extruded aluminium anodised finish. Diffuser: opal polycarbonate plastic. End-cap: Dual-colour injected polycarbonate plastic. Electrical connection via flap in rear of body. Continuous linking possible. Complete with 4000K LED

Dimensions: 1180 x 37 x 60 mm

Total power: 18.3 W

Luminaire luminous flux: 2159 lm

Luminaire efficacy: 118 lm/W

Weight: 1.04 kg

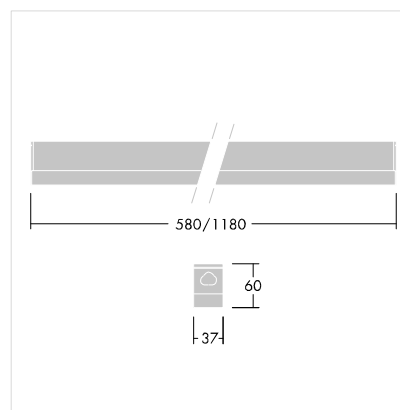
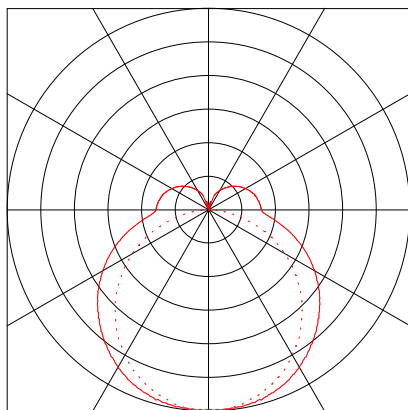
#### Luminaire data

Luminaire efficiency : 100%  
Luminaire efficacy : 120 lm/W  
Classification : B31 ↓83.5% ↑16.5%  
CIE Flux Codes : 40 70 90 84 98  
UGR 4H 8H : 27.6 / 23.9  
Power : 18.3 W  
Luminous flux : 2196 lm

#### Equipped with

Quantity : 1  
Designation :  
  
Power : 18 W  
Colour :  
Luminous flux : 2196 lm  
Colour reproduction : 80

Dimensions : 1180 mm x 37 mm x 60 mm



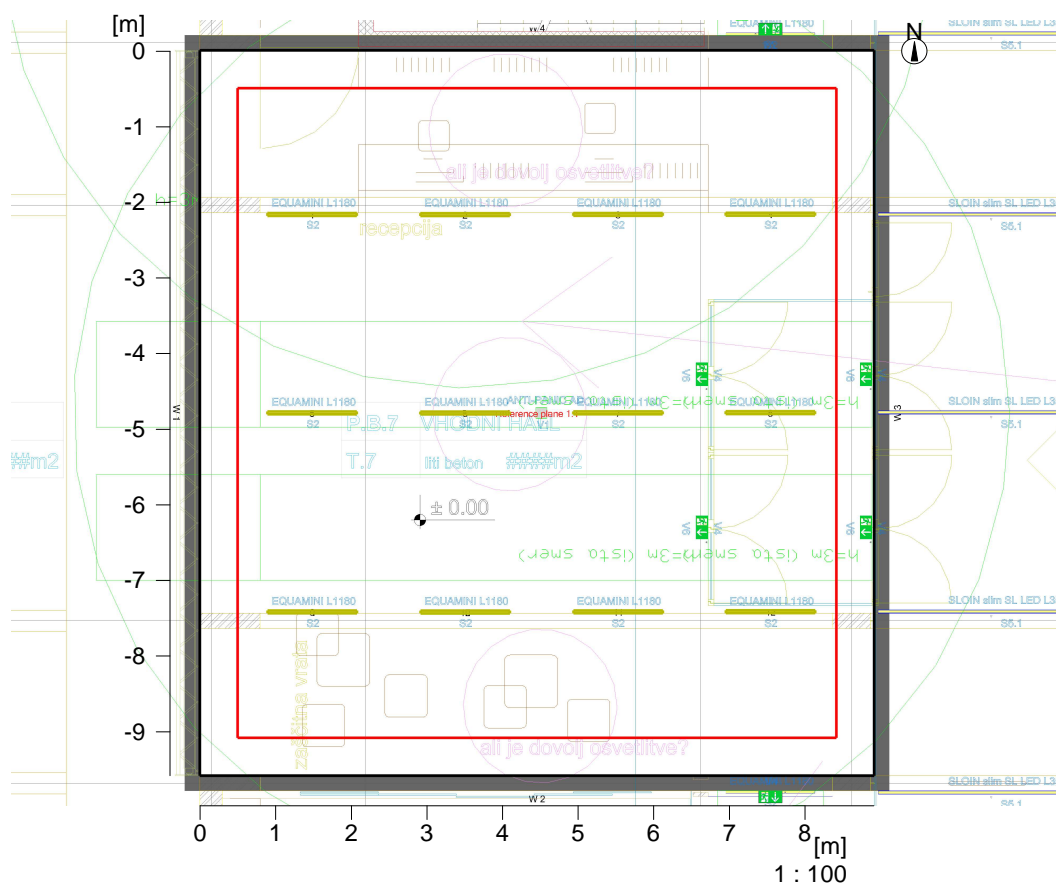
Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 422/17  
 Date : 23.08.2017



## 2 Room 1

### 2.1 Description, Room 1

#### 2.1.1 Floor plan



Wall	x	y	Length	Reflectance
1	53.85 m	157.66 m	9.58 m	50.0 %
2	62.76 m	157.66 m	8.91 m	50.0 %
3	62.76 m	167.24 m	9.58 m	50.0 %
4	53.85 m	167.24 m	8.91 m	50.0 %
Floor				20.0 %
Ceiling				70.0 %
Room height		2.70 m		
Height of reference plane		0.75 m		

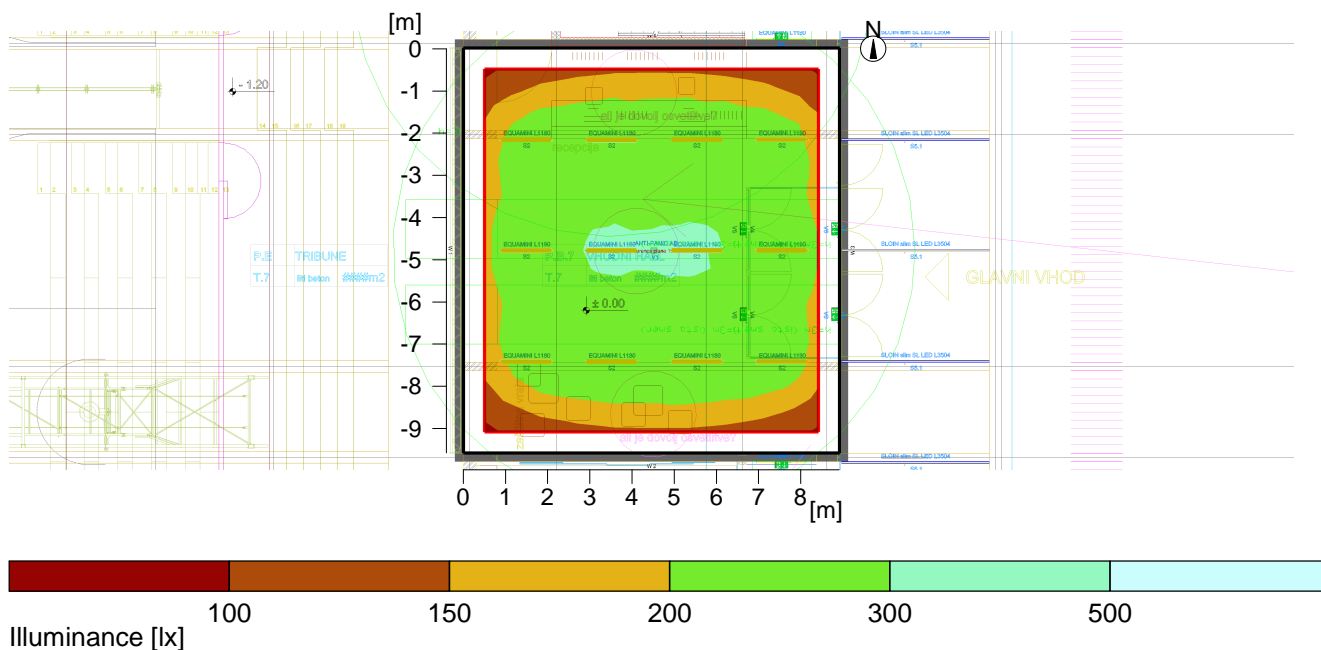
Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 422/17  
 Date : 23.08.2017



## 2 Room 1

### 2.2 Summary, Room 1

#### 2.2.1 Result overview, Evaluation area 1



#### General

Calculation algorithm used	Average indirect fraction
Height of luminaire plane	2.65 m
Maintenance factor	0.80
Total luminous flux of all lamps	26352 lm
Total power	219.6 W
Total power per area (85.35 m²)	2.57 W/m² (1.14 W/m²/100lx)

#### Evaluation area 1

#### Reference plane 1.1

User profile: Educational premises - Educational buildings  
 5.36.16 (EN 12464-1, 8.2011) Entrance halls (Ra >80.00)

	Horizontal
Em	225 lx ( $\geq 200$ lx)
Emin	122 lx
Emin/Eav (Uo)	0.54 ( $\geq 0.40$ )
Emin/Emax (Ud)	0.42
UGR (6.4H 6.8H)	$\leq 27.9$ ( $< 22.00$ )
Position	0.75 m

Type No.\Make

Object : TELOVADNICA VIŽMARJE  
Installation : EDUCATION AND SCIENCE  
Project number : 422/17  
Date : 23.08.2017



**ZUMTOBEL**

## **2 Room 1**

### **2.2 Summary, Room 1**

#### **2.2.1 Result overview, Evaluation area 1**

1	12	Thorn
		Order No. : 22660812
		Luminaire name : EQUAMINI L1180 LED2100-840 [STD]
		Equipment : 1 x LED_EQUM_2196_HF 18 W / 2196 lm

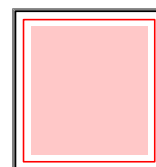
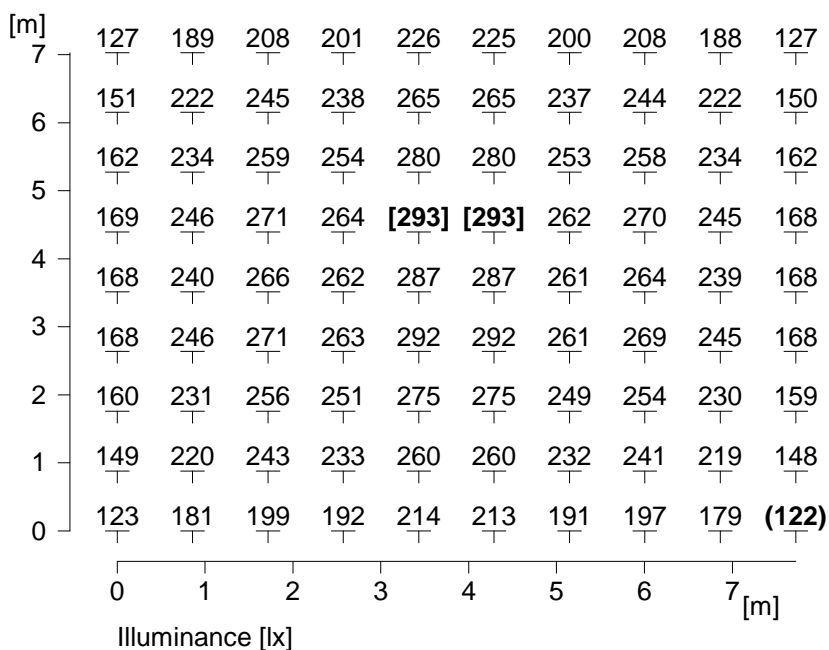
Object : TELOVADNICA VIŽMARJE  
 Installation : EDUCATION AND SCIENCE  
 Project number : 422/17  
 Date : 23.08.2017



## 2 Room 1

### 2.3 Calculation results, Room 1

#### 2.3.1 Table, Reference plane 1.1 (E)



Height of the reference plane

Average illuminance	Eav	: 0.75 m
Minimum illuminance	Emin	: 225 lx
Maximum illuminance	Emax	: 122 lx
Uniformity Uo	Emin/Eav	: 293 lx
Diversity Ud	Emin/Emax	: 1 : 1.85 (0.54)
		: 1 : 2.41 (0.42)