



# Glare and Diffuse Sources

**A look into Diffuse Luminaires and how to  
characterize glare**

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## Unified Glare Rating (UGR)

Unified Glare Rating calculations provide a psychological measure of the discomfort glare in interior lighting application

UGR is often used as an alternative to Visual Comfort Probability (VCP)

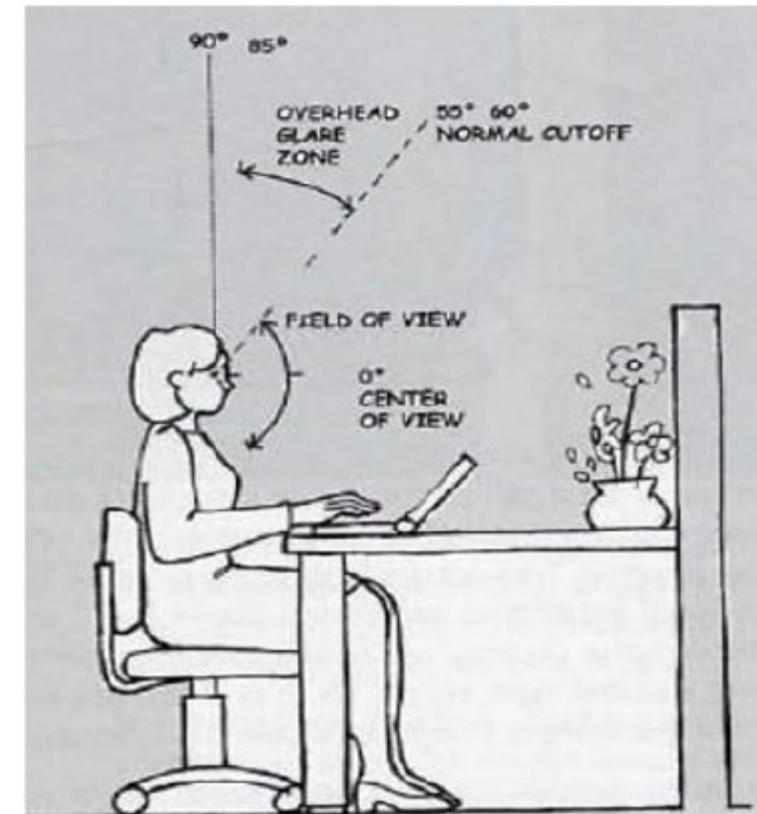
UGR is based on observer location, viewing direction, room reflectance values, and the location and properties of products.

UGR	HOPKINSON'S RATING SCALE
10	Imperceptible
13	Just Perceptible
16	Perceptible
19	Just Acceptable
22	Unacceptable
25	Just Uncomfortable
28	Uncomfortable

More Information:

CIE 117-1995, Discomfort Glare in Interior Lighting

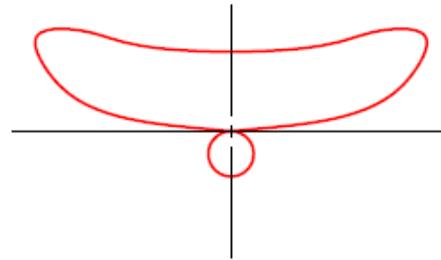
CIE 190:2010, Calculation and Presentation of Unified Glare Rating Tables for Indoor Lighting Luminaires



Source picture: IES DG-18-08

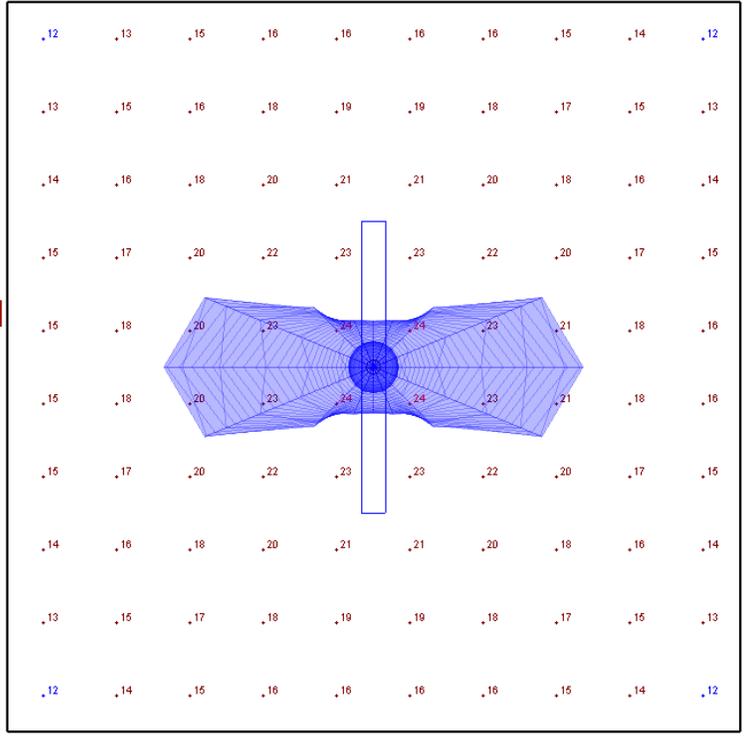
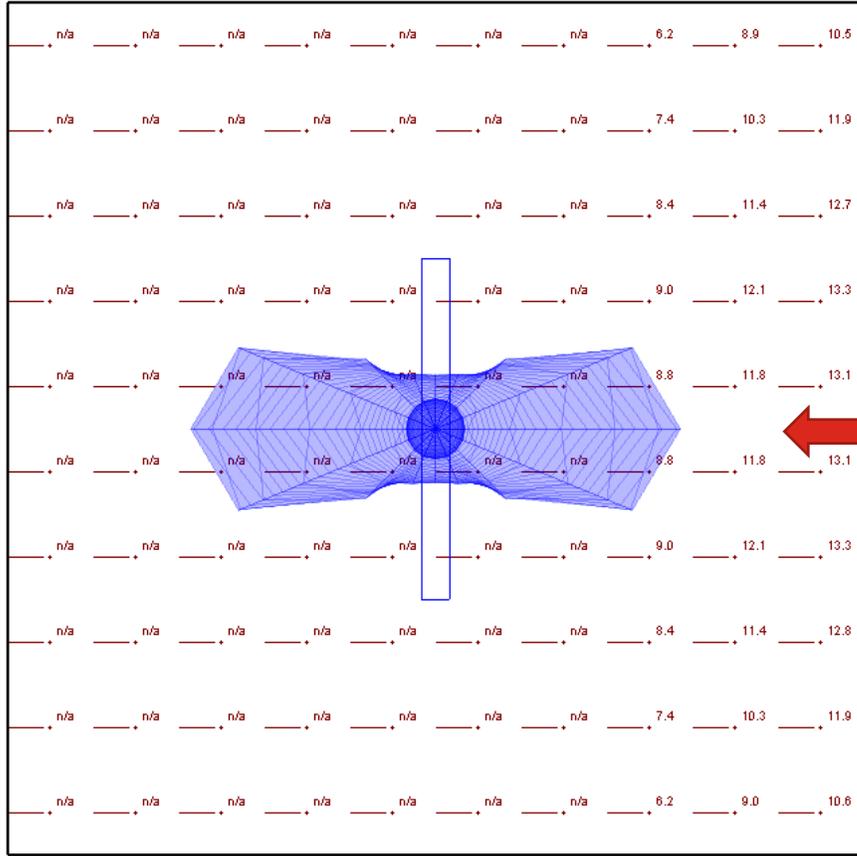
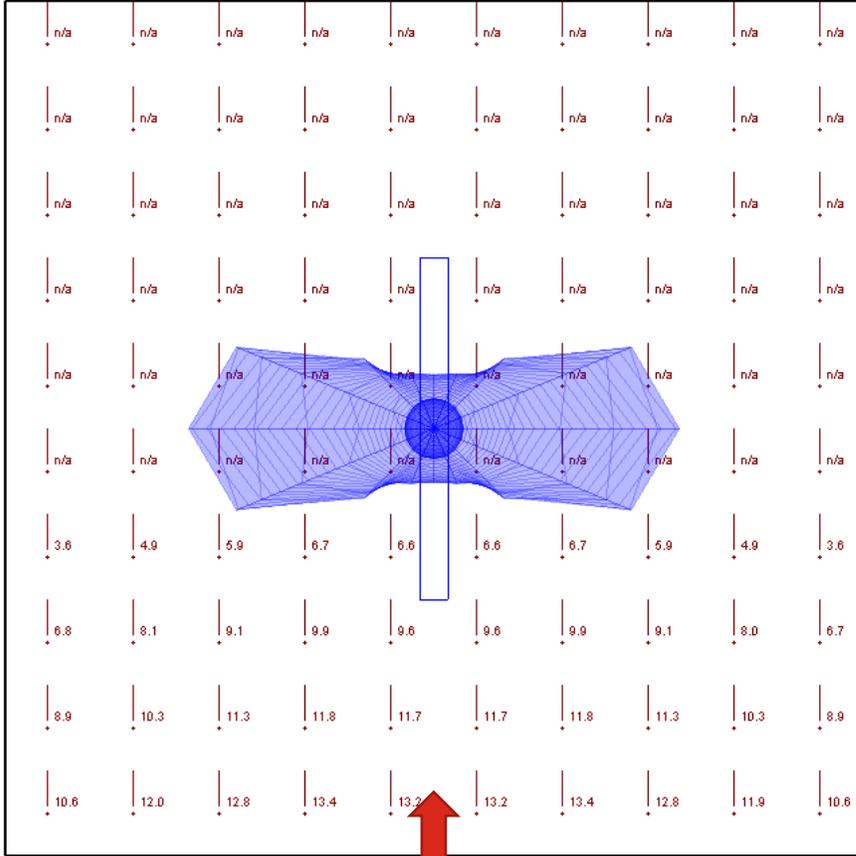
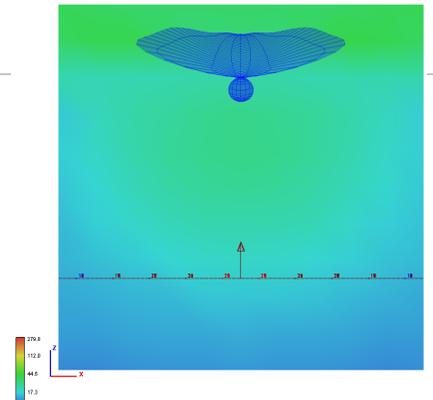
## Product of Consideration : Suspended Pendant

- Olessence Pendant with Peerless' SSL Duet Technology
- OLED Direct source (4), backed by powerful indirect LED





**UGR EXAMPLE: OLED / LED DUET FIXTURE, 4FT LENGTH, 4499LM**  
**INDIRECT LED / DIRECT OLED: 85% UP / 15% DOWN**  
**10' X 10' X 10' SPACE, FIXTURE @ 8FT AFF**



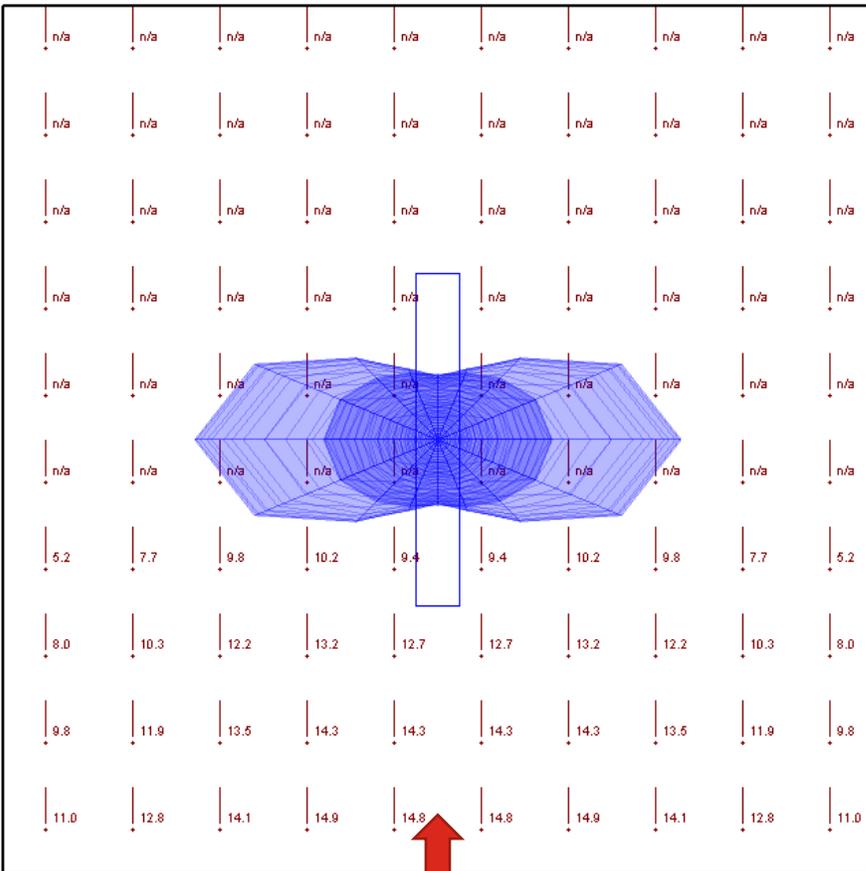
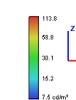
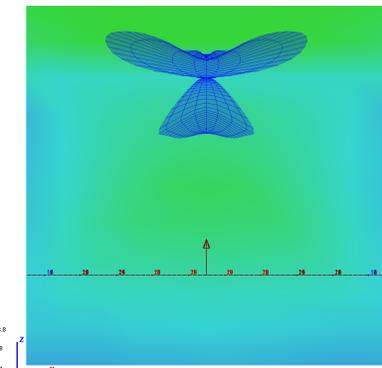
**UGR - NORTH**  
 AVE 9.4, MAX 13.4  
 IMPERCEPTIBLE, PERCEPTIBLE

**UGR - WEST**  
 AVE 10.4, MAX 13.3  
 IMPERCEPTIBLE, PERCEPTIBLE

**ILLUMINANCE**  
 AVE FC 18, MAX FC 24  
 MAX/MIN 2.0:1



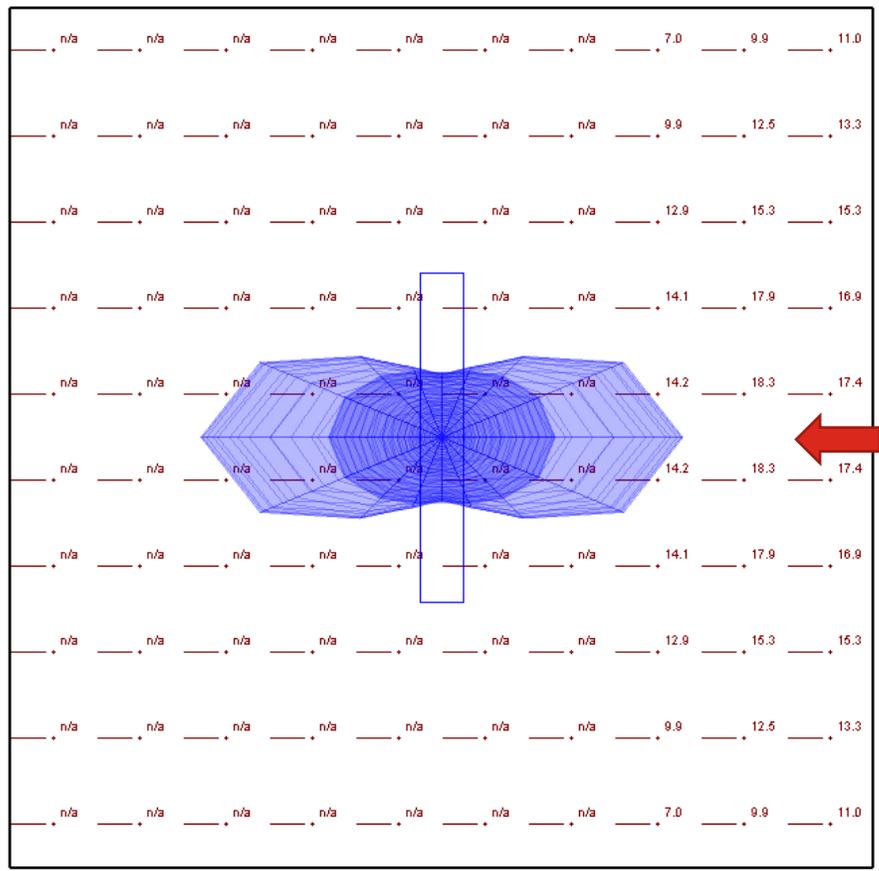
**UGR EXAMPLE: EDGE LIT LED FIXTURE, 4FT LENGTH, 4078LM**  
**INDIRECT / DIRECT LED SOURCE: 60% UP / 40% DOWN**  
**10' X 10' X 10' SPACE, FIXTURE @ 8FT AFF**



**UGR - NORTH**

AVE 11.5, MAX 14.9

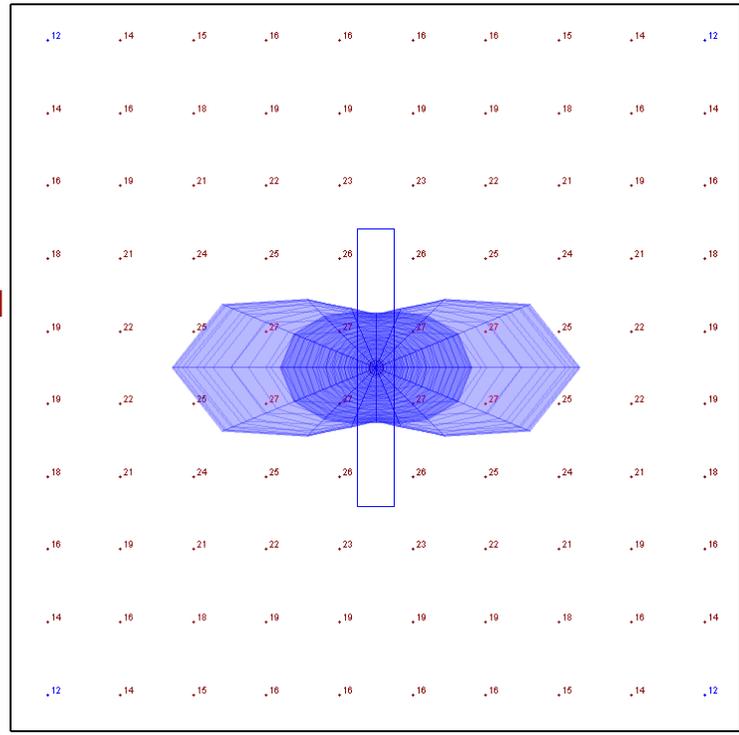
JUST PERCEPTIBLE, PERCEPTIBLE



**UGR - WEST**

AVE 13.7, MAX 18.3

PERCEPTIBLE, ACCEPTABLE



**ILLUMINANCE**

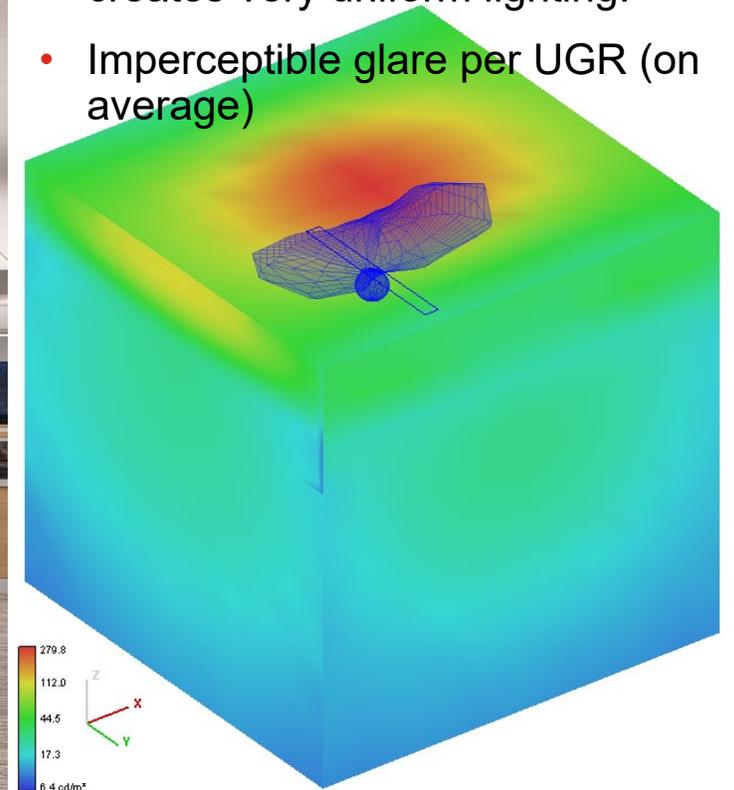
AVE FC 20, MAX FC 27

MAX/ MIN 2.3:1

## In Context

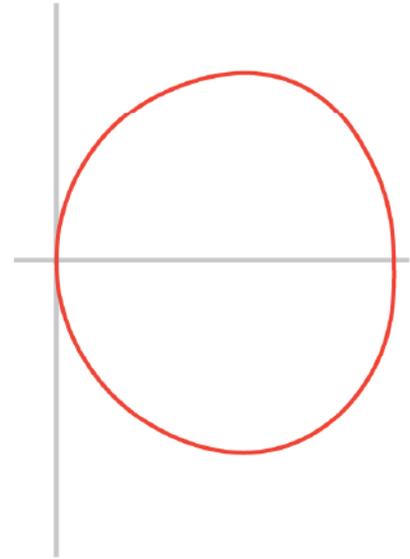
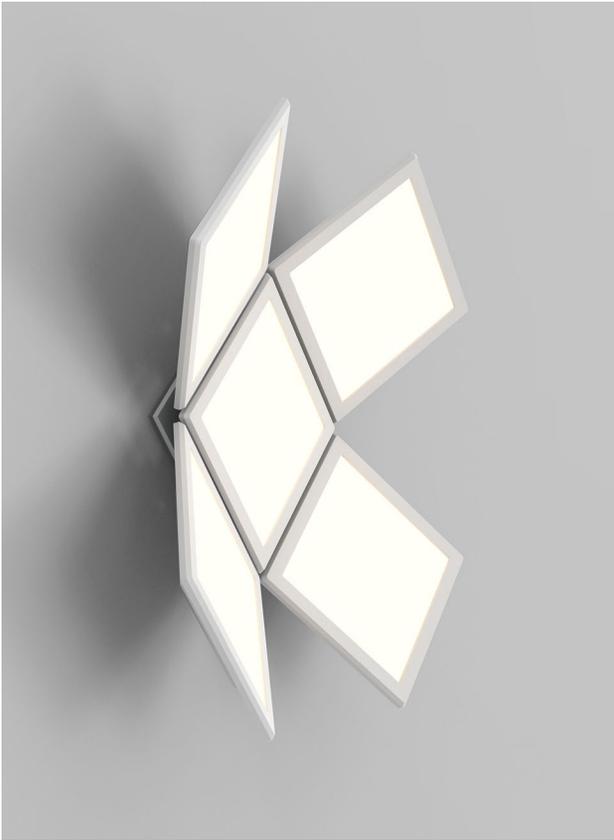


- Luminance Map (right) does portray the surface brightness in the space well!
- Nice bright ceiling with even direct source, when used right creates very uniform lighting.
- Imperceptible glare per UGR (on average)

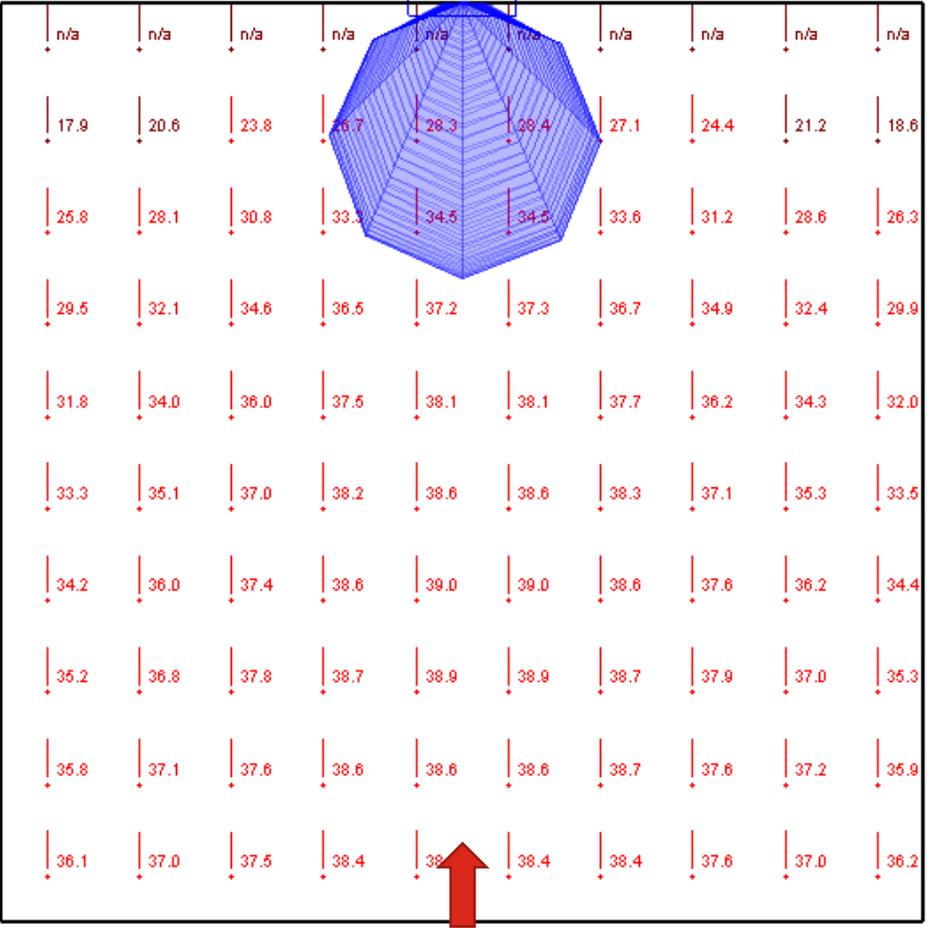
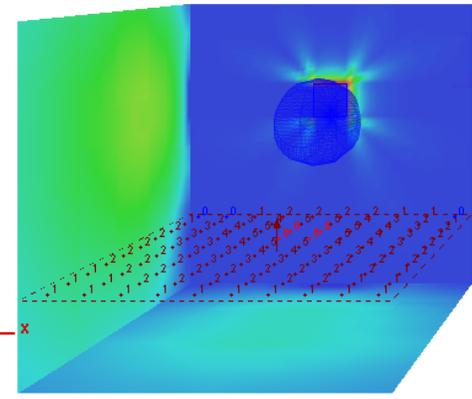


## Product of Consideration : Wall Sconce

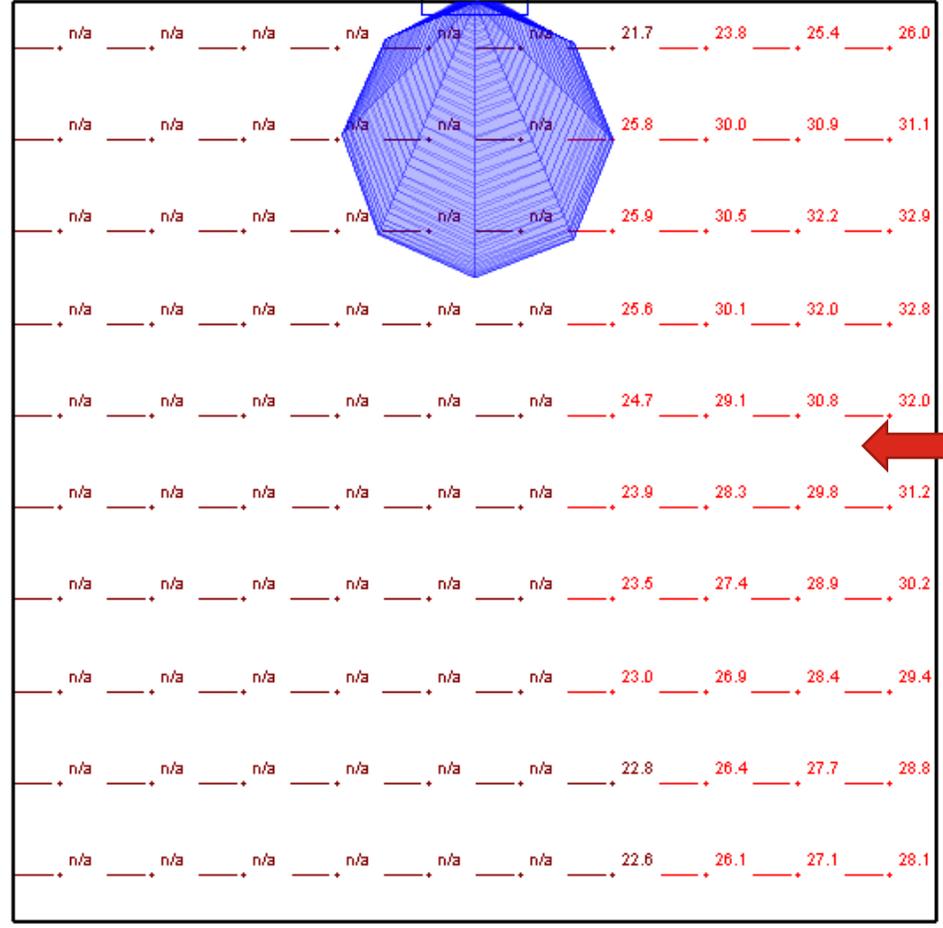
- Winona REVEL, Sconce direct view, (5) OLED
- Winona AEDAN, Sconce direct view, (2) OLED



UGR EXAMPLE: MULTI OLED SCONCE, 1272LM  
 DIRECT VIEW (5) OLED SOURCE: 100%  
 10' X 10' X 10' SPACE, FIXTURE @ 6FT AFF

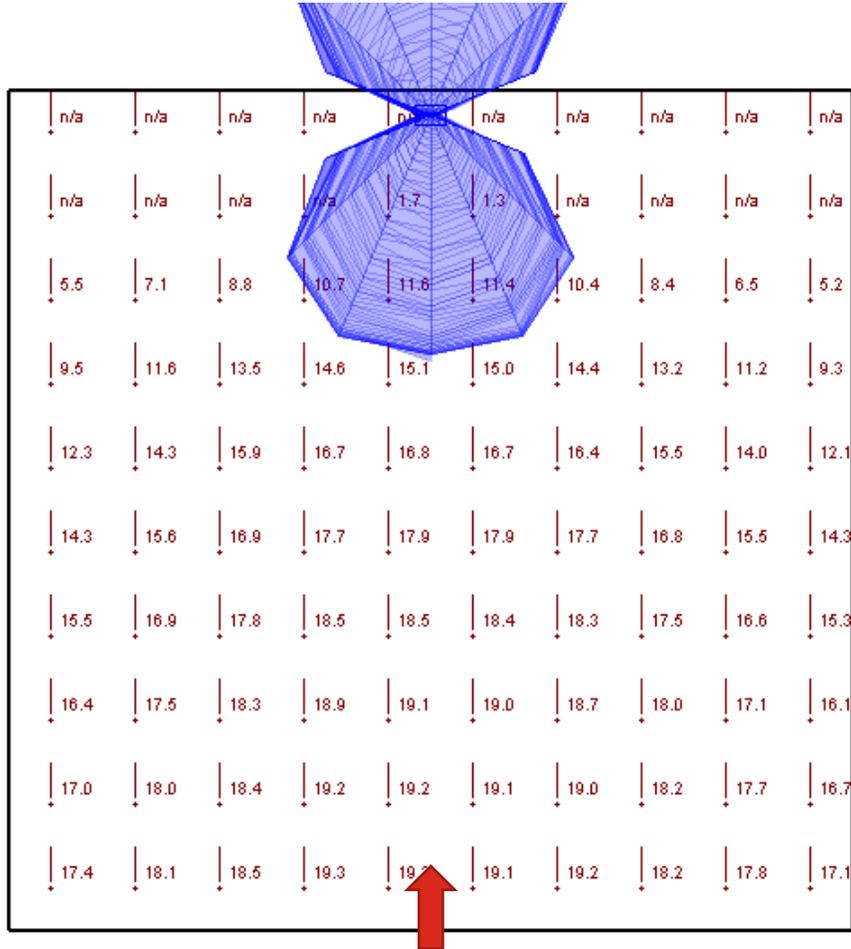


**UGR - NORTH**  
 AVE 34.5, MAX 39  
 UNCOMFORTABLE



**UGR - WEST**  
 AVE 27.8, MAX 32.9  
 JUST UNCOMFORTABLE, UNCOMFORTABLE

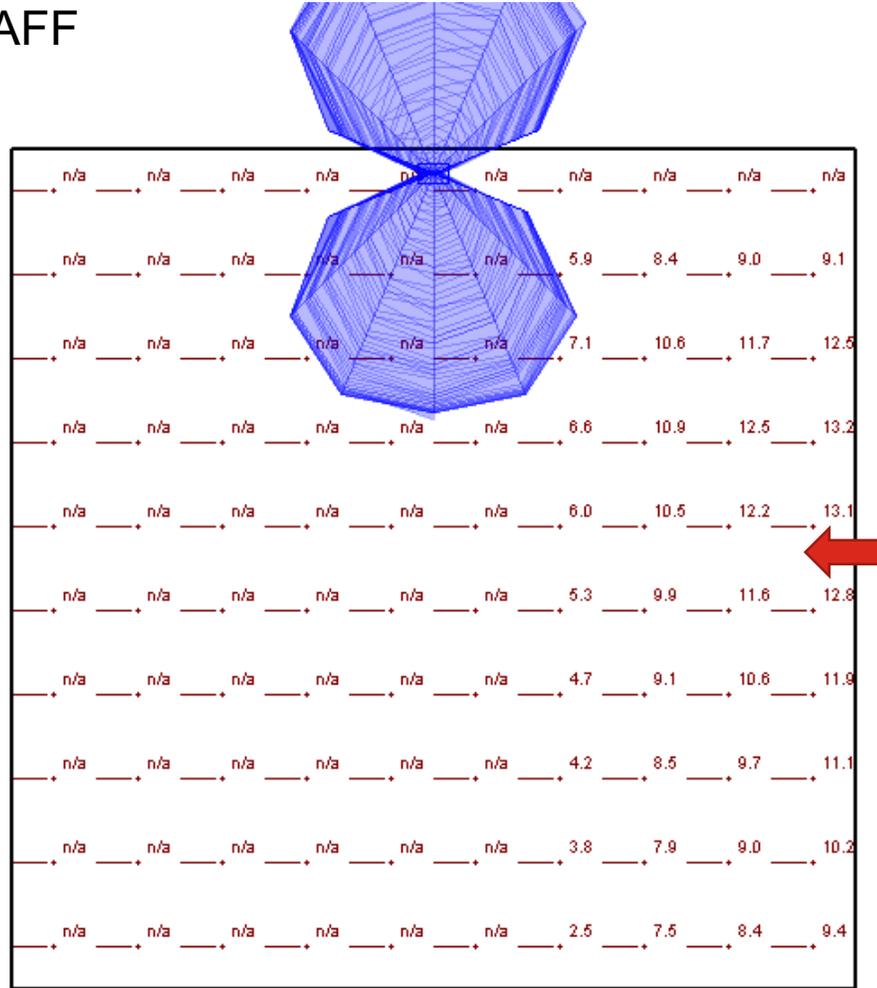
**UGR EXAMPLE: OLED SCONCE, 506LM**  
**FRONT & BACK OLED SOURCE: 50% FRONT / 50% BACK**  
**10' X 10' X 10' SPACE, FIXTURE @ 6FT AFF**



**UGR - NORTH**

AVE 15.2, MAX 19.3

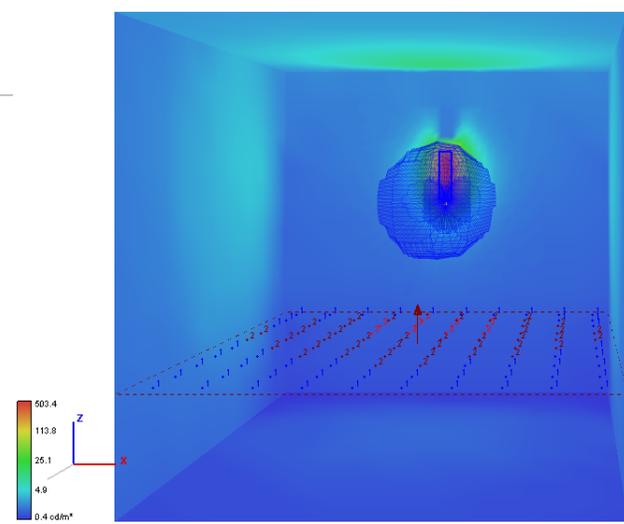
PERCEPTIBLE, ACCEPTABLE



**UGR - WEST**

AVE 9.1, MAX 13.2

IMPERCEPTIBLE, JUST PERCEPTIBLE



## In Context



- Separately placed files in the calculation will have different results than grouped panels such as the REVEL.
- We want to create fun patterns on the wall.

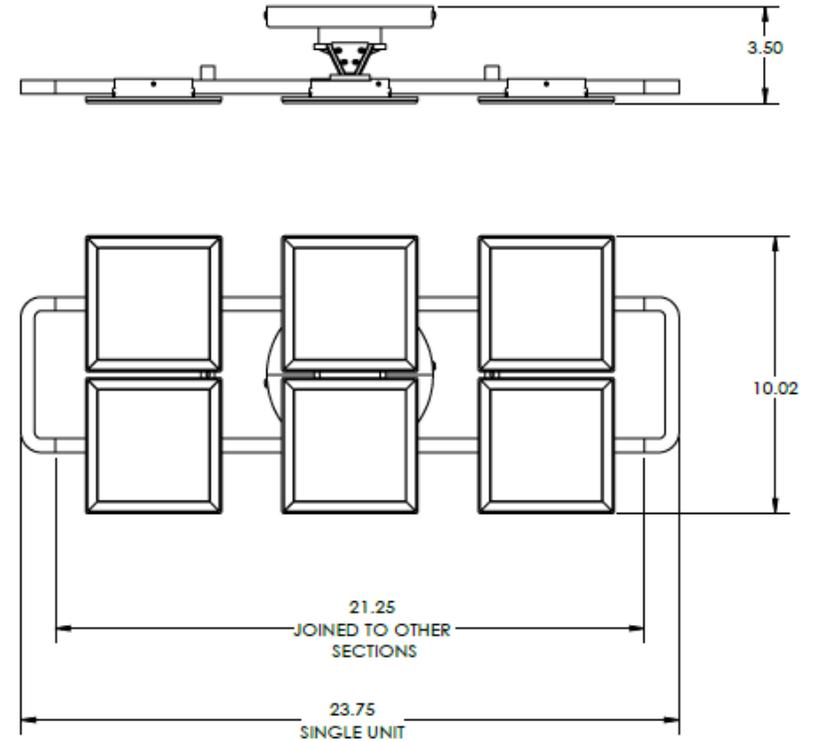
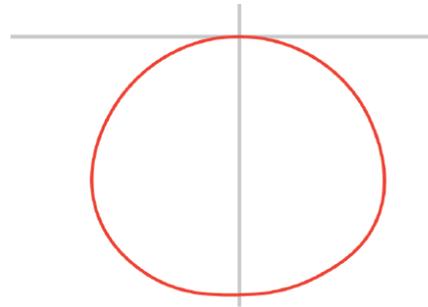
## Product of Consideration: Ceiling Surface

Winona Trilia, Ceiling Surface mount, (6) OLED

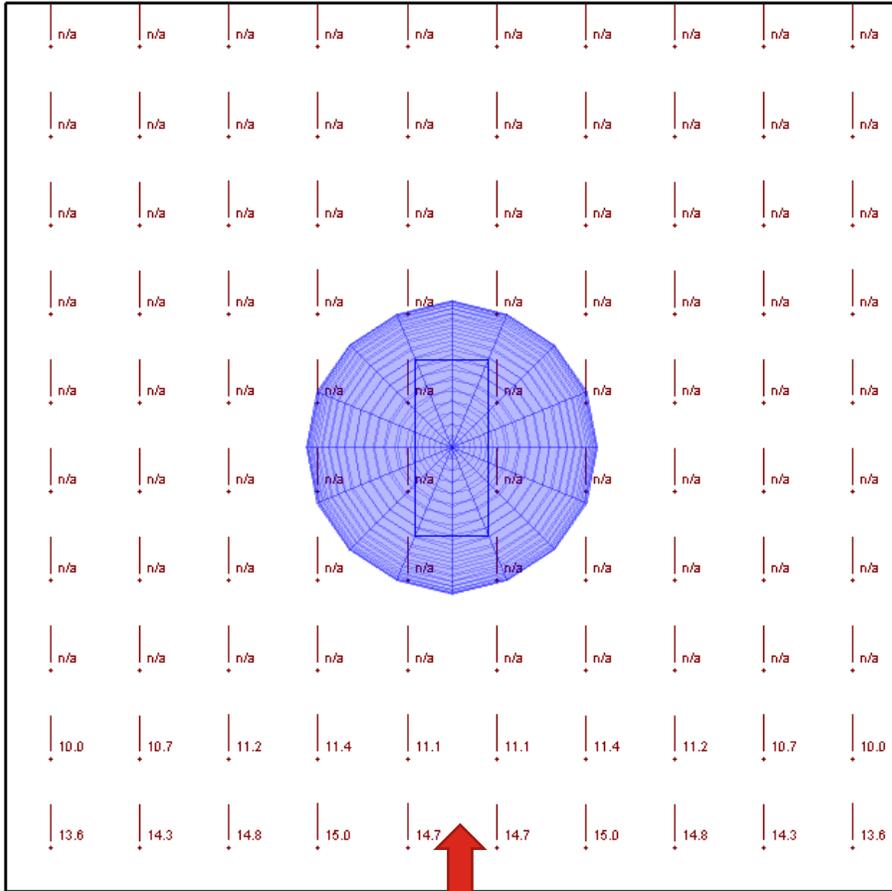


STR

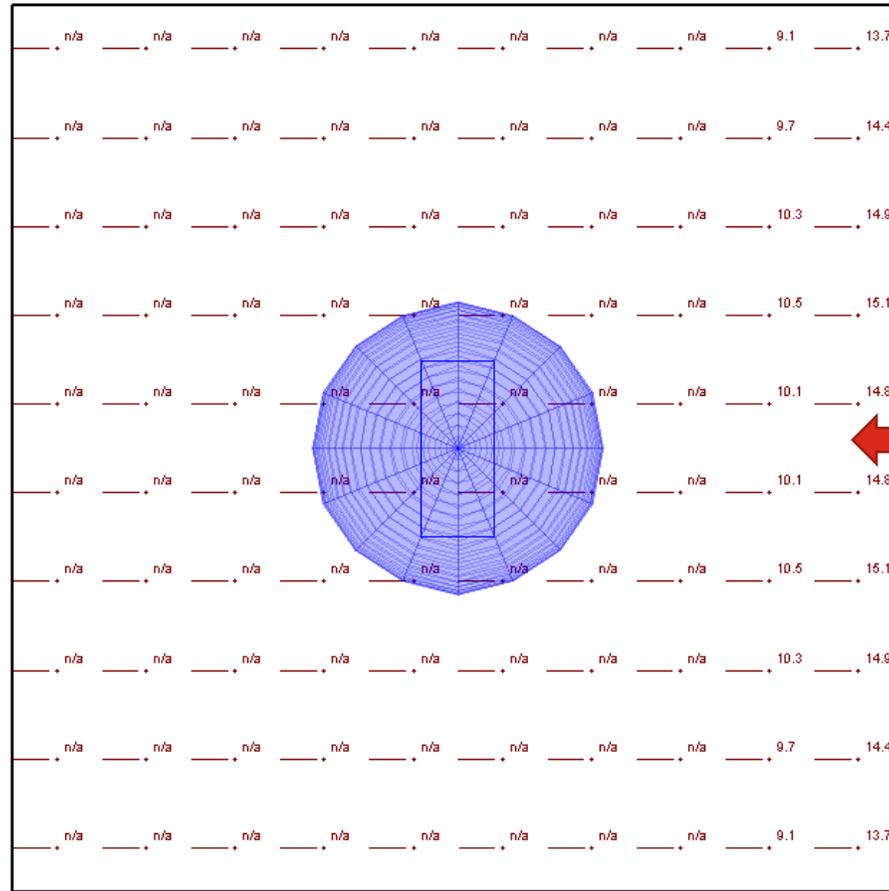
100% Down



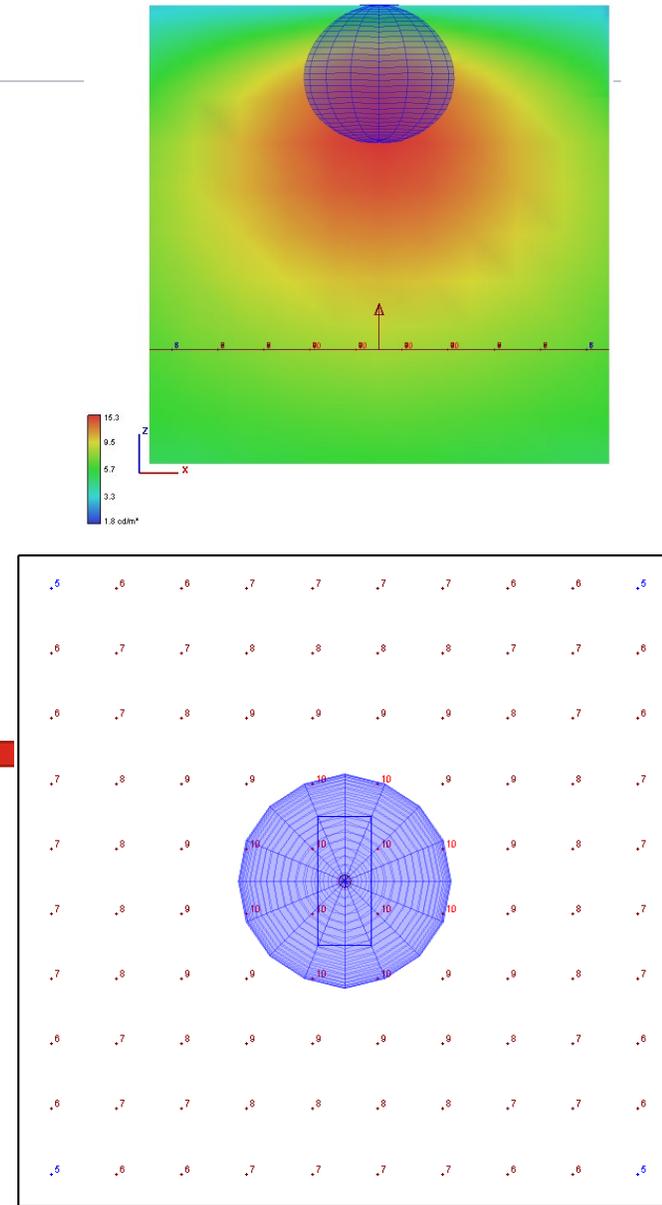
**UGR EXAMPLE: OLED CEILING MOUNT, 1523LM**  
**DIRECT OLED SOURCE: 100% DIRECT**  
**10' X 10' X 10' SPACE, FIXTURE @ 10FT AFF**



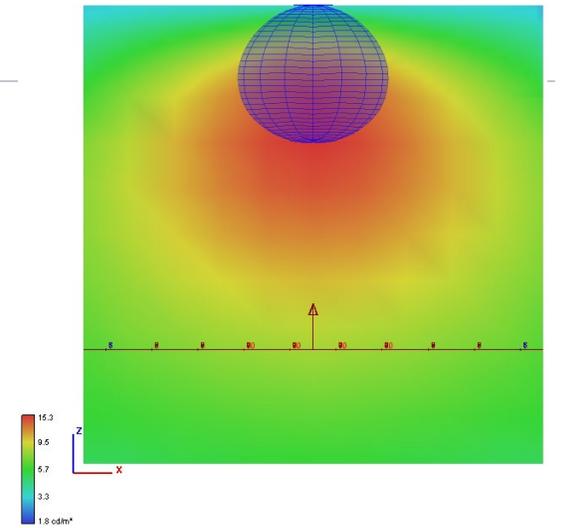
**UGR - NORTH**  
 AVE 15.2, MAX 19.3  
 PERCEPTIBLE, ACCEPTABLE



**UGR - WEST**  
 AVE 9.1, MAX 15.1  
 IMPERCEPTIBLE, PERCEPTIBLE



**ILLUMINANCE**  
 AVE FC 8, MAX FC 10  
 MAX/ MIN 2.0:1





## In Context



- Place enough luminous surface in the space to create sufficient amount of light but also good uniformity

## Results & assumptions by fixture:

1. Glare from the OLED/LED direct/indirect pendant is nearly imperceptible, rates very high per UGR.
  - A pendant with direct/indirect source can provide a good UGR rating largely due to lowering the contrast ratio
2. Glare from the LED direct/indirect pendant is perceptible, but very good per UGR.
  - Small advantage to the OLED pendant, largely due to lower direct luminance and less contrast
3. Glare from the OLED Wall Sconce 100% forward facing (5 panel) is uncomfortable.
  - UGR of a sconce may be specially misleading if evaluated without context
4. Glare from the OLED Wall Sconce 50% forward / 50% back (2 panel) is acceptable or better on average.
  - This sconce fares better with UGR due to backlighting and reducing contrast
5. Glare from the OLED ceiling surface mount, 100% direct is acceptable.
6. Glare from the OLED ceiling surface mount, run of 3 is perceptible or better on average.
  - Dark areas in the space were lessened, a more evenly lit space may help with glare.

## General UGR problem areas:

- Provides an overview or average rating of discomfort glare per application, is not a good indicator on a singular level of uncomfortable luminaire characteristics.
- The UGR metric considers the average luminance of the luminaire. Pixilation or spotty luminance may be overlooked. Multiple sources within a file are not separated. Limitation of absolute photometry.
- Color, color rendering and resulting comfort levels are not factored.
- Results vary per application, no standard or scale for someone to choose a product “off the shelf”.

### Homogeneity of Optical Parameters

The OLED Panel Brite 3 Rectangle is a large area device and the luminance value may depend on the location within the active area. A very small color point distribution may also be observed.



Figure 22: Typical luminance distribution for a Brite 3 Rectangle Level 1. Operation conditions: vertical in air, RT (= 25 °C),  $I = I_{\text{max}}$

## In summary:

Latest in Visual 3D Lighting Calculation software

How do today's glare metrics characterize what we are seeing?

What means can we come up with for giving a better idea of glare on the front end of the project?

Evaluation of glare on a fixture level? How to differentiate one product quality from another, benefitting online shoppers

### Homogeneity of Optical Parameters

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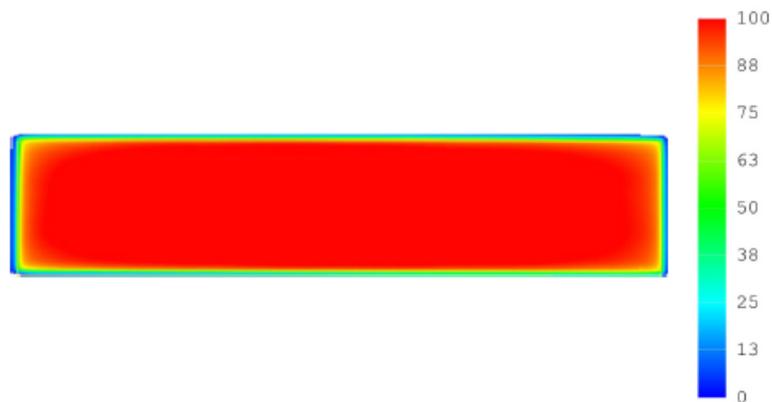
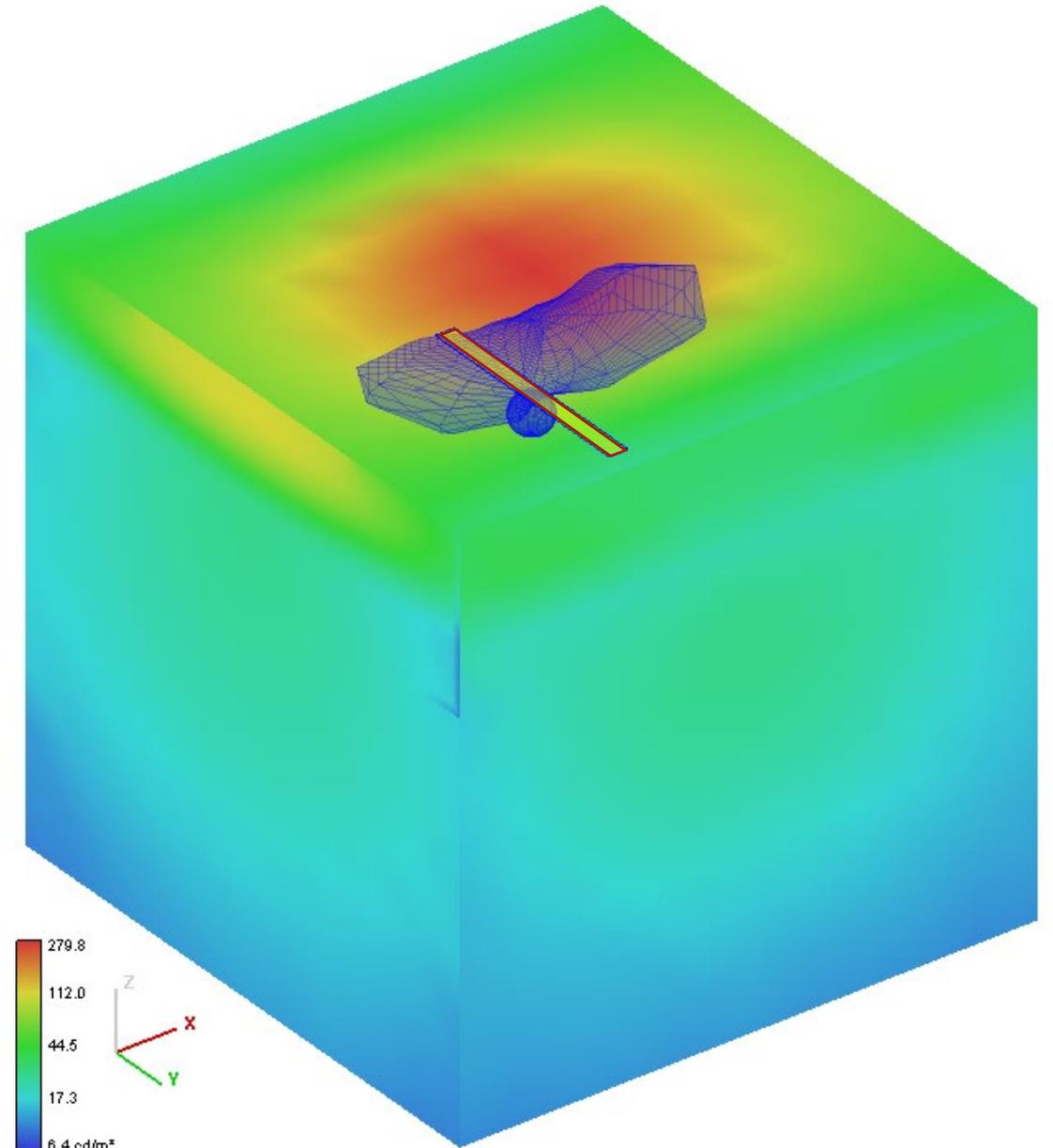


Figure 22: Typical luminance distribution for a Brite 3 Rectangle Level 1. Operation conditions: vertical in air, RT (= 25 °C),  $I = I_{n,real}$

Homogeneity map, OLEDWorks Brite 3 Technical Specification





Thank you!