



# Light pollution reduction

SSpc7 | Possible 1 point

## Intent

### Pilot Credit Closed

This pilot credit is closed to new registrations

To increase night sky access, improve nighttime visibility, and reduce the consequences of development for wildlife and people.

## Requirements

Meet uplight and light trespass requirements, using either the backlight-uplight-glare (BUG) method (Option 1) or the calculation method (Option 2). Projects may use different options for uplight and light trespass.

Meet these requirements for all exterior luminaires located inside the project boundary (except those listed under "Exemptions"), based on the following:

- the photometric characteristics of each luminaire when mounted in the same orientation and tilt as specified in the project design; and
- the lighting zone of the project property (at the time construction begins). Classify the project under one lighting zone using the lighting zones definitions provided in the Illuminating Engineering Society and International Dark Sky Association (IES/IDA) Model Lighting Ordinance (MLO) User Guide.

Additionally, meet the internally illuminated signage requirement.

### Uplight

#### Option 1. BUG rating method

Do not exceed the following luminaire uplight ratings, based on the specific light source installed in the luminaire, as defined in IES TM-15-11, Addendum A.

Table 1. maximum uplight ratings for luminaires

MLO lighting zone	Luminaire uplight rating
LZ0	U0
LZ1	U1
LZ2	U2
LZ3	U3
LZ4	U4

### OR

#### Option 2. calculation method

Do not exceed the following percentages of total lumens emitted above horizontal.

Table 2. maximum percentage of total lumens emitted above horizontal, by lighting zone

MLO lighting zone	Maximum allowed percentage of total luminaire lumens emitted above horizontal
LZ0	0%
LZ1	0%
LZ2	1.5%
LZ3	3%
LZ4	6%

### AND

#### Light trespass

##### Option 1. BUG rating method

Do not exceed the following luminaire backlight and glare ratings (based on the specific light source installed in the luminaire), as defined in IES TM-15-11, Addendum A, based on the mounting location and distance from the lighting boundary.

and distance from the lighting boundary.

**Table 3. maximum backlight and glare ratings**

Luminaire mounting	MLO lighting zone				
	LZ0	LZ1	LZ2	LZ3	LZ4
Allowed backlight ratings					
> 2 mounting heights from lighting boundary	B1	B3	B4	B5	B5
1 to 2 mounting heights from lighting boundary and properly oriented	B1	B2	B3	B4	B4
0.5 to 1 mounting height to lighting boundary and properly oriented	B0	B1	B2	B3	B3
< 0.5 mounting height to lighting boundary and properly oriented	B0	B0	B0	B1	B2
Allowed glare ratings					
Building-mounted > 2 mounting heights from any lighting boundary	G0	G1	G2	G3	G4
Building-mounted 1–2 mounting heights from any lighting boundary	G0	G0	G1	G1	G2
Building-mounted 0.5 to 1 mounting heights from any lighting boundary	G0	G0	G0	G1	G1
Building-mounted < 0.5 mounting heights from any lighting boundary	G0	G0	G0	G0	G1
All other luminaires	G0	G1	G2	G3	G4

The lighting boundary is located at the property lines of the property, or properties, that the LEED project occupies. The lighting boundary can be modified under the following conditions:

- When the property line abuts a public area that includes, but is not limited to, a walkway, bikeway, plaza, or parking lot, the lighting boundary may be moved to 5 feet (1.5 meters) beyond the property line.
- When the property line abuts a public street, alley, or transit corridor, the lighting boundary may be moved to the center line of that street, alley, or corridor.
- When there are additional properties owned by the same entity that are contiguous to the property, or properties, that the LEED project is within and have the same or higher MLO lighting zone designation as the LEED project, the lighting boundary may be expanded to include those properties.

Orient all luminaires less than two mounting heights from the lighting boundary such that the backlight points toward the nearest lighting boundary line. Building-mounted luminaires with the backlight oriented toward the building are exempt from the backlight rating requirement.

**OR**

**Option 2. calculation method**

Do not exceed the following vertical illuminances at the lighting boundary (use the definition of lighting boundary in Option 1). Calculation points may be no more than 5 feet (1.5 meters) apart. Vertical illuminances must be calculated on vertical planes running parallel to the lighting boundary, with the normal to each plane oriented toward the property and perpendicular to the lighting boundary, extending from grade level to 33 feet (10 meters) above the height of the highest luminaire.

**Table 4. maximum vertical illuminance at lighting boundary, by lighting zone**

MLO lighting zone	Vertical illuminance
LZ0	0.05 fc (0.5 lux)
LZ1	0.05 fc (0.5 lux)
LZ2	0.10 fc (1 lux)
LZ3	0.20 fc (2 lux)
LZ4	0.60 fc (6 lux)

**AND**

**Internally illuminated exterior signage**

Do not exceed a luminance of 200 cd/m<sup>2</sup> (nits) during nighttime hours and 2000 cd/m<sup>2</sup> (nits) during daytime hours.

**Exemptions from uplight and light trespass requirements**

The following exterior lighting is exempt from the requirements, provided it is controlled separately from the nonexempt lighting:

- specialized signal, directional, and marker lighting for transportation;
- lighting that is used solely for façade and landscape lighting in MLO lighting zones 3 and 4, and is automatically turned off from midnight until 6 a.m.;
- lighting for theatrical purposes for stage, film, and video performances;
- government-mandated roadway lighting;
- hospital emergency departments, including associated helipads;
- lighting for the national flag in MLO lighting zones 2, 3, or 4; and
- internally illuminated signage.

## General Pilot Documentation Requirements

### REGISTER FOR THE PILOT CREDIT

- Participate in the [LEEDuser pilot credit forum](#)
- Complete the feedback survey:

CREDITS 1-14

CREDITS 15-27

CREDITS 28-42

CREDITS 43-56

CREDITS 57-67

CREDITS 68-82

CREDITS 83-96

#### Credit specific

#### Building Design & Construction

##### Exterior Lighting – provide the following:

- A site plan showing all sign locations and exterior light fixtures with designations and an associated fixture schedule with brief descriptions including lamp information for all fixtures
- A description with drawings and/or images of the site and all immediately adjacent properties, documenting a lighting zone for each of these. Any lighting zone 4 designations should include a document from the local zoning authority showing that they have authorized that zone designation for that site.
- A list of all exempt exterior luminaires and which exemption they qualify under.
- Signage: Narrative and drawings describing the luminance levels of the signs during hours of darkness and hours of daylight. Daylight hours are between 30 minutes after sunrise and 30 minutes before sunset. Nighttime hours are between 30 minutes after sunset and 30 minutes before sunrise.

##### Uplight

##### Option 1 BUG Rating Method:

- The lighting zone designation used for this option
- A lighting schedule documenting the three-dimensional orientation (plan/ elevation) of each non-exempt exterior fixture and it's U-Rating in that orientation (identical luminaires in the same orientation may be grouped).

##### Option 2 Calculation Method:

- The lighting zone designation used for this option
- A spreadsheet showing the following for each non-exempt luminaire (including summations where appropriate): (identical luminaires in the same orientation may be grouped)
  - Catalog #
  - Quantity of this luminaire
  - The three dimensional orientation of the luminaire (plan/ elevation)
  - The lumens emitted by the luminaire in that orientation
  - The lumens emitted by the luminaire in that orientation above the horizon
- A summation calculation showing compliance based on the data presented above.

##### Light Trespass

##### Option 1 BUG Rating Method:

- The lighting zone designation used for this option
- Where appropriate, a narrative justifying extending the lighting boundary line past the property line in accordance with the credit requirements.
- a spreadsheet showing the following for each non-exempt luminaire: (identical luminaires in the same orientation may be grouped)

- Catalog #

- The three dimensional orientation of the luminaire (plan/ elevation)
- The orientation of the luminaire relative to the nearest lighting boundary line
- The backlight and glare ratings of the luminaire in the defined position
- An statement of compliance

### **Option 2 Calculation Method:**

A point-by-point calculation showing initial vertical illuminances. Each vertical plane shall include:

- The maximum vertical illuminance encountered
- The lighting zone for this plane
- A statement of compliance

### **Multitenant Complex Projects:**

Include a narrative that describes:

- How the safety/security issues, comfort, and economic activity were addressed and enhanced,
- The shared exterior lighting amenities,
- How light pollution and energy consumption was minimized, and
- How specific projects fit into the overall design.

### **Existing Buildings: Operations & Maintenance**

Interior Lighting- provide the following:

- Narrative and drawings showing control locations, describing the lighting controls used on the interior lighting, the sequence of operation, and how these controls comply with this credit and section 9 of the ANSI/ASHRAE/IES Standard 90.1-2010.

### **Exterior Lighting**

Option 1:

- A luminaire schedule identifying those luminaires where the sum of the mean lamp lumens exceeds 2,500
- A photometric report of those luminaires demonstrating that no light is emitted above 90 degrees from straight down in their final installed position(s).

Option 2:

- Provide proof that the project complies with NC, CS, Schools, Retail, Healthcare above.

Option 3:

- A plan showing the location of the measurement points used to measure the night illumination levels.
- A description of the measurement results.

### **Additional questions**

1. Were you able to understand and comply with the credit language as written?
2. Were there barriers to implementing the strategies used under this credit?
3. Do the criteria associated with quality exterior lighting align with your project's productivity, safety, and quality needs?

### **Changes:**

- 1/15/2013: minor language changes to align with [LEED v4 5th public comment version of SSc6](#)
- BD&C
  - Reordered requirements
  - Removed multitenant complex requirements
  - Added language to make the credit globally applicable
- EBOM
  - Removed interior lighting requirements
  - Minor wording clarifications