MANDATORY MEASURES
OUTDOOR LIGHTING CONTROLS

(Reference: Sub-Chapter 4, Section 130)
Additions and Alterations

Any alteration that increases the connected lighting load must meet all mandatory, prescriptive, or performance measures that are required.
BACKLIGHT, UPLIGHT, AND GLARE (BUG) RATINGS

The BUG system is used to evaluate luminaire performance in relation to lighting trespass, sky glow, and high angle brightness. This is necessary in order to reduce light pollution, which has a negative effect on wildlife and the surrounding environments.

**Backlight**
Backlight includes all illumination that is in the space between the ground and 80 degrees above ground. Backlighting causes light trespass, which occurs when light is cast in unwanted areas due to poor control.

**Uplight**
Uplight is defined as all light spanning across the sky. This causes artificial sky glow, the illumination of the night sky due to excess lighting.

**Glare**
Glare is any overlapping light between the uplight and the backlight which can be visually disabling and offensive.
BUG ANGLES

UPLIGHT

GLARE

BACKLIGHT

Section 130.2 (b)

10/7/2013

SLIDE 167

SECTION 8

OUTDOOR LIGHTING
LUMINAIRES THAT MUST COMPLY WITH BUG REQUIREMENTS

Outdoor luminaires using lamps or light sources rated greater than 150 watts must comply with uplight and glare limitations if they are in the following areas:

1. Parking lots and service stations
2. Building entrances
3. All canopies
4. Outdoor dining areas
5. All outdoor sales areas
LUMINAIRES THAT DO NOT NEED TO COMPLY WITH BUG

These limits do not apply to:

- Signs
- Building facades, public monuments, statues, and vertical surfaces of bridges
- Lighting required for health or safety
- Temporary lighting
- Replacement of pole-mounted luminaires in areas where:
  - Spacing between poles is greater than six times the mounting height of the existing luminaires, and
  - No additional poles are being added, and
  - No new wiring is not being installed, and
  - The connected lighting power wattage is not increased
BUG RATINGS AND REQUIREMENTS

BUG ratings are determined by the amount of light in each angular component per backlight, uplight, and glare. Each BUG zone has a maximum number of lumens that is allowed—called the maximum zonal lumen limit.


<table>
<thead>
<tr>
<th>TABLE 130.2-A: UPLIGHT RATINGS (MAXIMUM ZONAL LUMENS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary Solid Angle</td>
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<tr>
<td>Uplight High (UH) 100–180 degrees</td>
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<tr>
<td>Uplight Low (UL) 90–&lt;100 degrees</td>
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</tbody>
</table>
HOW EXTERIOR SPACES COMPLY WITH TITLE 24

There are two major steps for exterior spaces to comply with Title 24:

1. **Meet all mandatory requirements**
   The mandatory requirements set forth required controls that must be installed and the functionality that an exterior lighting system must be capable of.

2. **Meet all prescriptive or performance requirements**
   The prescriptive requirements set a maximum lighting power allowance for exterior space. A space complies with these requirements if the *actual* lighting power used in the space is less than the *allowed* lighting power.
MANDATORY REQUIREMENTS: ALL SPACES

1. Any outdoor luminaire that is capable of operating an incandescent lamp that uses more than 100 watts must be controlled by a motion sensor.

2. All outdoor lighting must be controlled by a photocontrol or astronomical time switch that turns off all lighting when daylight is available.

3. Outdoor lighting must be circuited and controlled independently from other electrical loads.
MANDATORY REQUIREMENTS:
LUMINAIRES MOUNTED BELOW 24 FEET

Where the bottom of a luminaire is mounted below 24 feet, lighting controls must be installed as follows:

1. Must have motion sensors or other control systems that automatically control lighting in response to the presence of occupants.
2. Controls need to be capable of automatically reducing the lighting power of each luminaire by at least 40 percent but not more than 80 percent.
3. Controls must automatically turn on lights when an area becomes occupied.
4. No more than 1,500 watts of lighting power may be controlled together.
MANDATORY REQUIREMENTS:
LUMINAIRES MOUNTED BELOW 24 FEET

These requirements do not apply to the following spaces:
1. Sales frontage, lots, and canopies
2. Building facades, ornamental hardscape, and outdoor dining

Or the following luminaire wattages:
1. Pole-mounted luminaires with a maximum rated wattage of 75 watts
2. Non-pole-mounted luminaires with a maximum rated wattage of 30 watts
3. Linear lighting with a maximum wattage of 4 watts per linear foot
MANDATORY REQUIREMENTS:
LUMINAIRES MOUNTED BELOW 24 FEET

There are different requirements for specific spaces:

1. Sales frontage, lots, and canopies must have a part-night control or motion sensors
2. Building facades, ornamental hardscapes, and outdoor dining must have a part-night control, motion sensor, or centralized time-based lighting control

A part-night control is a time or occupancy based lighting control that is programmed to reduce or turn off the lighting power to an outdoor luminaire for a portion of the night.
Mandatory Requirements: Luminaires Mounted Below 24 Feet

Wallpacks

If the bottom of the luminaire is mounted 24 feet or less above the ground, wallpacks > 30W must be controlled by a motion sensor that reduces lighting power by at least 40 percent but not more than 80 percent.
PARKING GARAGES

Parking garages are considered interior nonresidential spaces, except for the top level of a multi-tier garage.

- General lighting must have occupant sensing controls with at least one control step between 20 and 50 percent of design lighting power
- No more than 500 watts of rated lighting power may be controlled together
- Parking garage areas with ≥ 36 square feet of glazing or opening must have automatic daylighting controls.