

PRACTICAL GUIDE

FOR OUTDOOR LIGHTING REQUIRED FOR THE PREVENTION OF LIGHT POLLUTION



Purpose

To guide the public on the available outdoor lighting systems that may be used as types of light sources, complying with Act 18, better known as the Program for the Control and Prevention of Light Pollution, as amended, and Rule 20 of the Regulation for the Control and Prevention of Light Pollution, known as RCPCL in Spanish.

Light Pollution caused by Sky Glow

Among the main causes of light pollution, it is included the superior hemispheric emissions of outdoor lights. This is defined as the light emitted horizontally from a lamp or luminaire, generally over 80° measured from its vertical area of orientation (90°) from the bottom of the luminaire.

1 GLARE

There are two modes of glare that are recognized: the one that disturbs the visual comfort of the observer in a lighted area, and visual impairment due to glare.

The RCPCL defines "visual impairment due to glare" as the reduction of visibility provoked by the reflection of light. It also defines glare as a light that causes discomfort, visual impairment, or temporary blindness.

It is possible to achieve a better visibility at night in urban and rural spaces with less light where the glare is controlled and reduced to the maximum. Among glare reducing solutions there is the use of luminaires that direct the light towards the floor or the wall, when necessary, and not directly, towards the persons who are close to the same.

2 LIGHT TRESPASSING

The RCPCL defines light trespassing as light that reaches unwanted places or where it is not needed; also known as unwanted light that enters a third party's property, even though it may be involuntary. The light emitted by an issuing source that reaches an area away from where it is supposed to reach is also known as "scattered light."

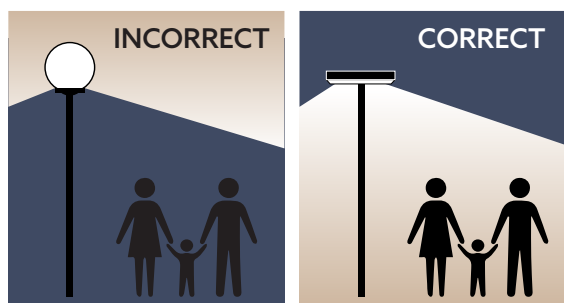
What is Light Pollution?

The adverse effect of artificial light that provokes a reflection in the night sky, or any light when projected towards another's property, causing light trespassing.

Effects of Light Pollution in the environment and ecosystems.



To Correctly direct the light



Al momento de seleccionar o instalar una luminaria es importante no iluminar sobre los 90° del plano horizontal y focalizar la luz al área que se necesita solamente evitando iluminar hacia la atmósfera o propiedades colindantes.

Levels of lighting permitted in Puerto Rico

In order to achieve the objectives established by the RCPL, there are **eight classes of exterior lighting** that include the control and value requirements at different times of the day taken from the adjacent illuminated property

For each class, there is an assigned zone of our island in which the characteristics of the place require levels of illumination that guarantee the protection of the ecological characteristics of the place or of the species that inhabit it.

Permitted Illumination in Exterior and Special Areas of Puerto Rico

CLASSES OF EXTERIOR AND SPECIAL AREAS*	VALUE Sunset until 11:00 pm	VALUE 11:00 pm until sunrise
Class 1 - Dark terrain	0.10 fc	0.05 fc
Class 2 - Low Level of Ambient Light	0.30 fc	0.10 fc
Class 3 - Medium Level of Ambient Light	0.80 fc	0.30 fc
Class 4 - High Level of Ambient Light	1.50 fc	0.60 fc
Class 5 - Special Zone for Vieques	0.10 fc	0.10 fc
Class 6 - Special Zone for La Parguera (5 miles)	0.10 fc	0.10 fc
Class 7 - Special Zone for Las Cabezas de San Juan	0.10 fc	0.10 fc
Class 8 - Special Zone for Beaches Used by Marine Turtles	0.05 fc	0.05 fc

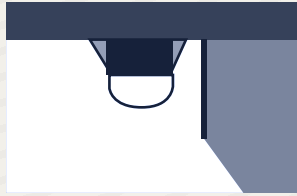
*As measured vertically and outside of the adjacent illuminated property. fc= foot-candle.

Recommendations for minimizing exterior and interior illumination of the properties located in class 8

Balconies and interiors

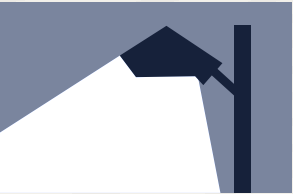


Use lamps that direct the light towards the ground.

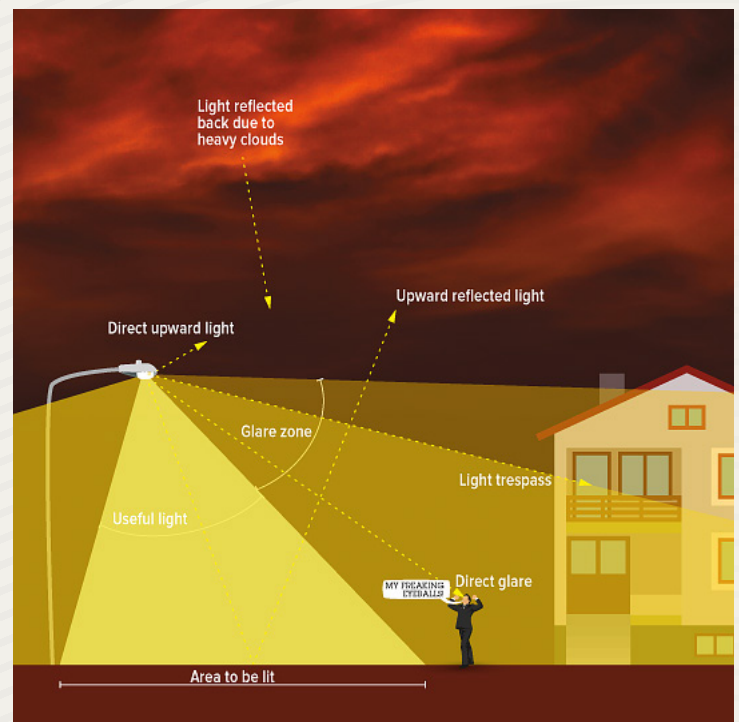


Install shields or visors to reduce the angle of illumination.

Patios and parkings



Use directional lighting, louvers, and mount the light fixtures as low as possible.



Beaches used by Marine Turtles

Marine turtles are guided by the light of the moon, the reflection of stars on the ocean, or an illuminated horizon in order to return to the ocean. Therefore, if we install white lights on or near the beach, it can cause disorientation leading them to choose the wrong way and exposing themselves to dehydration, predators, and the risk of death.

Special class #8 of the RCPL includes all the coastline that serves as a nesting place for marine turtles on their annual visit to our island. In addition to the value of illumination requirements expressed in the table above, if it is necessary to use illumination for safety purposes. The same will be limited to the following:

Low-Pressure Sodium Light Bulbs (LPS 18w up to a maximum of 35w diodes).

LED red, orange, or amber light bulbs, real neon red; or other luminaires with wavelength of 560 nm or higher.

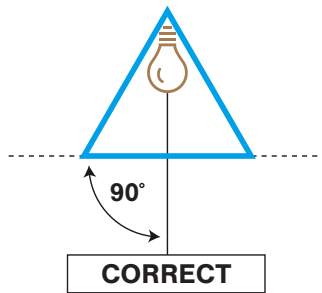
Protective visors or vegetative barricades that impede, as much as possible, the incidence of light towards the beach.



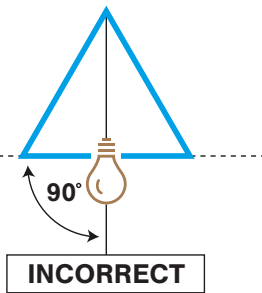
Selection of Luminaires

The RCPCL defines luminaires as a complete unit of illumination made up of light bulbs, together with a cover or lamp, designed to distribute light, define its position, and provide protection to the lamp, and connected to a power source.

Completely shielded light bulb



Partially shielded light bulb



The appropriate selection of the luminaire is essential as it will determine how light will be distributed. The luminaires known as "full cut off" are permitted in exterior areas since the lower portion of the bulb remains inside the lamp and, therefore, the beam of light is directed towards the ground and not towards the sky or a third party's property.

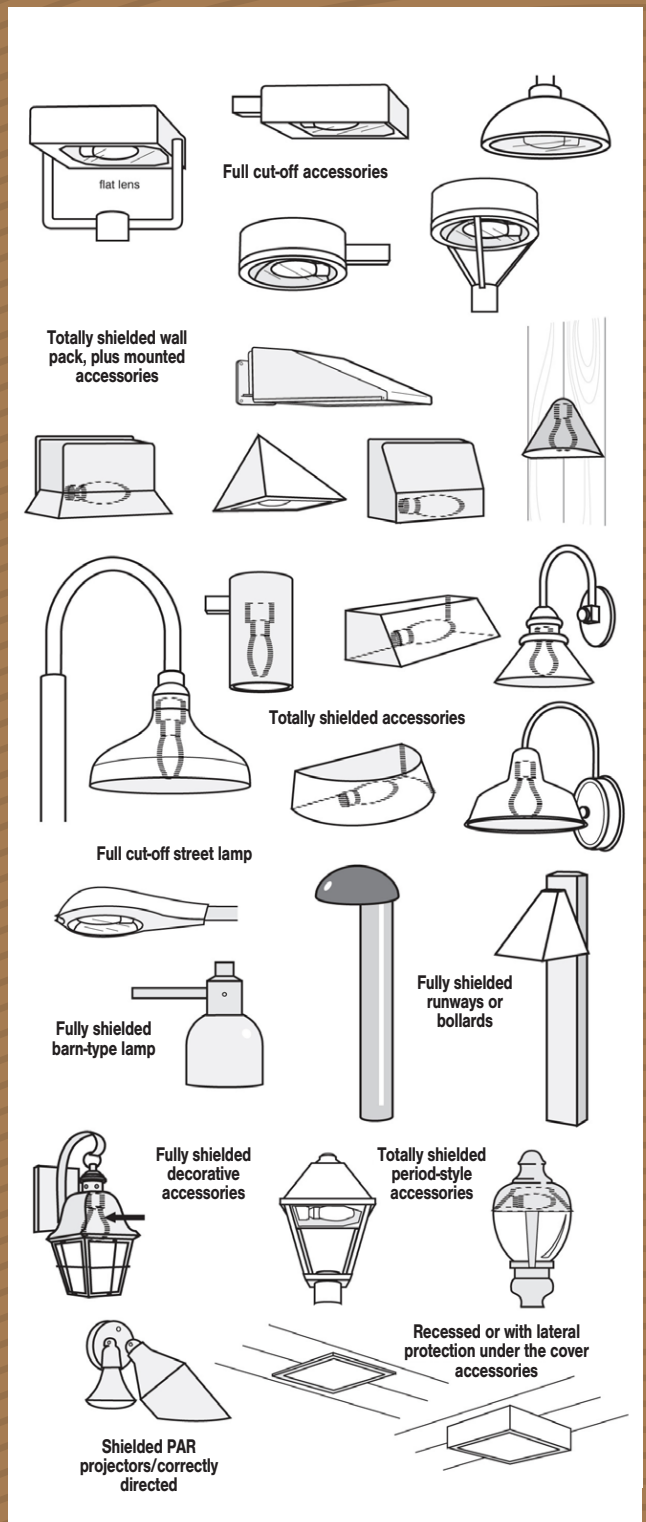
Installation Angle

The angle of installation and position of a lamp are very important to avoid glare or light trespassing to undesired places.

The RCPCL establishes a 90° permissible installation angle of a full cut off luminaire in a regular illumination class. In special areas, the angle of installation required should be less or equal to 90°. In addition, the use of visors or shields to direct the beam of light downwards are also required in this special class.



Examples of luminaires that comply with the RCPCL



When selecting a lamp for the exterior of your property make sure that the light bulb is inside the luminaire and that the cover is not made of a transparent material. In this way you minimize the glare and facilitate a greater night vision.

Filling light pollution complaints

Rule #8 of the RCPCL allows any citizen to file a complaint with the DNER for possible infractions to our regulatory provisions.

To file a complaint, depending on the municipality where you reside, you can communicate or visit any of our offices located around the island. The complaints may be made in person, by telephone, letters, or by e-mail to luminica@drna.pr.gov

What information is needed when filing a complaint?

You must provide to the Agency's personnel all pertinent information about the light pollution problem and the persons/properties involved. You should provide the following information:

- **Your name, phone, postal address, e-mail.**
- **Physical address and name of the property causing light pollution, including contact information of the owner or administrator.**
- **A detailed description of the problem which motivated the filing of a complaint.**
- **Daytime and nighttime photos of the luminaires that are causing the present problem.**



Contact us

2nd Floor, Section A
Environmental Agencies Building
Cruz A. Matos
State Road 8838, Sector el Cinco,
Rio Piedras PR 00926
Tel. (787)999-2200; X=5970 ; X=5865 ; X=5869

liminica@drna.pr.gov
nitzamarrero@drna.pr.gov
luisamarquez@drna.pr.gov

Visit our web page
www.drna.pr.gov

The protection of the night sky begins with you

- 1** Turn on only those lights you need and install them correctly



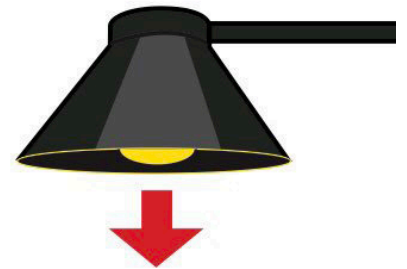
2

Use low consumption light bulbs and only those allowed in each luminaire class



3

Use visors or shields to direct the light downwards at an angle of 90° or less



4

Use a timer to reduce the use of artificial light.



5

In class 8, use amber, red or orange lights with wavelengths equal or larger than 560 nm.

