



The French decree on light pollution published on 27th Dec. 2018

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New national regulation on light pollution in France

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Décrets, arrêtés, circulaires

TEXTES GÉNÉRAUX

MINISTÈRE DE LA TRANSITION ÉCOLOGIQUE ET SOLIDAIRE

Arrêté du 27 décembre 2018 relatif à la prévention,
à la réduction et à la limitation des nuisances lumineuses

Concerned lighting categories

- Lighting of pathways, streets and roads
- Lighting of heritage
- Parks and gardens accessible to the public or belonging to a company, a social housing authority or a collective housing
- Lighting of outdoor sports facilities
- Illumination of non-residential buildings (facade lighting)
- Indoor lighting of professional premises
- Lighting of commercial showcases
- Lighting of parking lots
- Temporary lighting of special events
- Lighting of construction works

Categories NOT concerned

- Vehicle lighting
- Signs, advertisements (covered by another forthcoming regulation)
- Tunnel lighting
- Security lighting of airports and ports, railways, security lighting of seas and rivers
- Single homes (houses, frontyards, backyards)
- Pay tolls on motorways

Regulated parameters

- **Lighting schedule**
- **Upward light ratio (ULR)**
- **CIE flux code FC3**
- **Correlated color temperature**
- **Installed luminous flux density (lm/m^2)**

ULR α : on-site upward light ratio

Depends on real tilt angle of luminaire



ULR : 0 %

Specified in manufacturer datasheet (calculated from LID measured using gonio)



ULR : 0 %

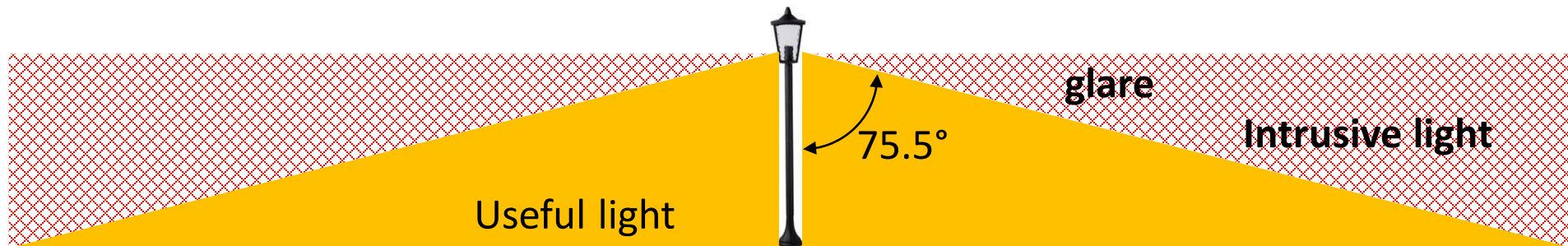
ULR α = 0 %

in-situ

ULR α = 10 %

CIE flux code n°3 (FC3)

Flux emitted in a solid angle of $3\pi/2$ steradian ($\pm 75,5^\circ$)
divided by flux emitted downward





FC3 = 76 %

Rendement: 60.09%
 Flux lumineux de(s) lampe(s): 4800 lm
 Flux lumineux du luminaire: 2884 lm
 Puissance: 36.0 W
 Rendement lumineux: 80.1 lm/W
 Classification luminaire selon CEI: 73
 CIE Flux Code: 21 49 76 73 60

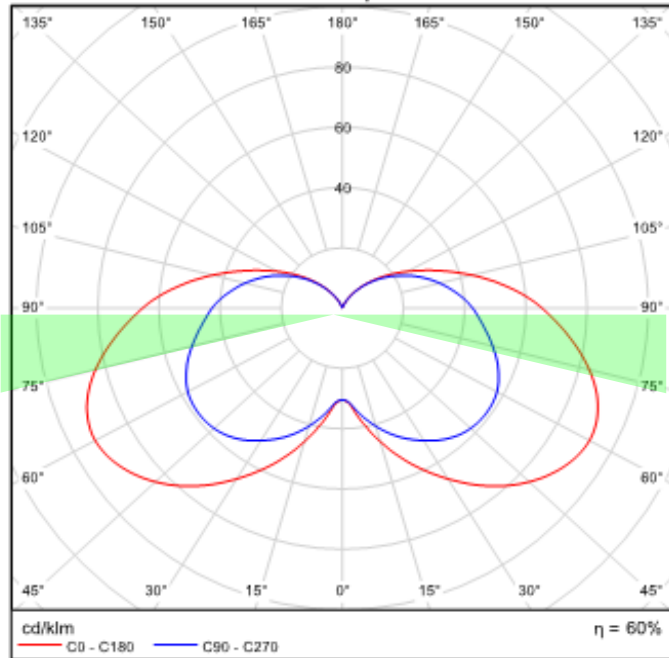
DIALux

FC3 = 96 %



Rendement: 82.67%
 Flux lumineux de(s) lampe(s): 3240 lm
 Flux lumineux du luminaire: 2679 lm
 Puissance: 26.0 W
 Rendement lumineux: 103.0 lm/W
 CIE Flux Code: 40 74 96 100 83

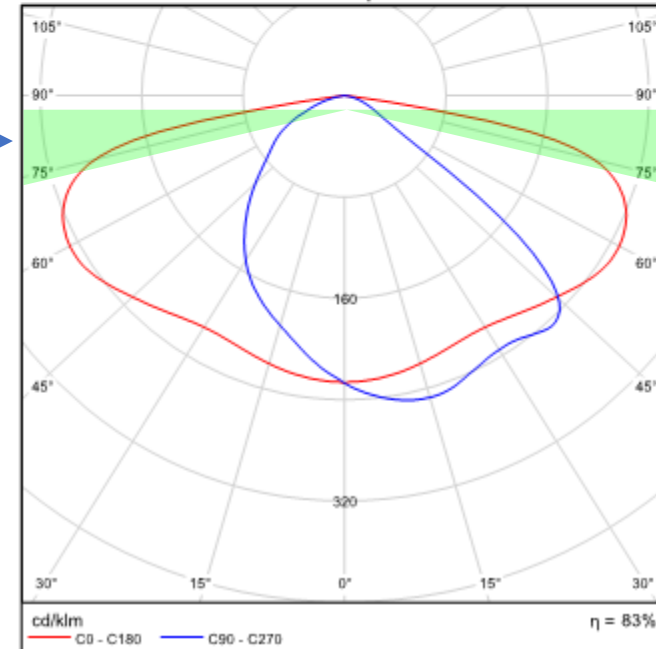
Emission de lumière 1 / LDC polaire



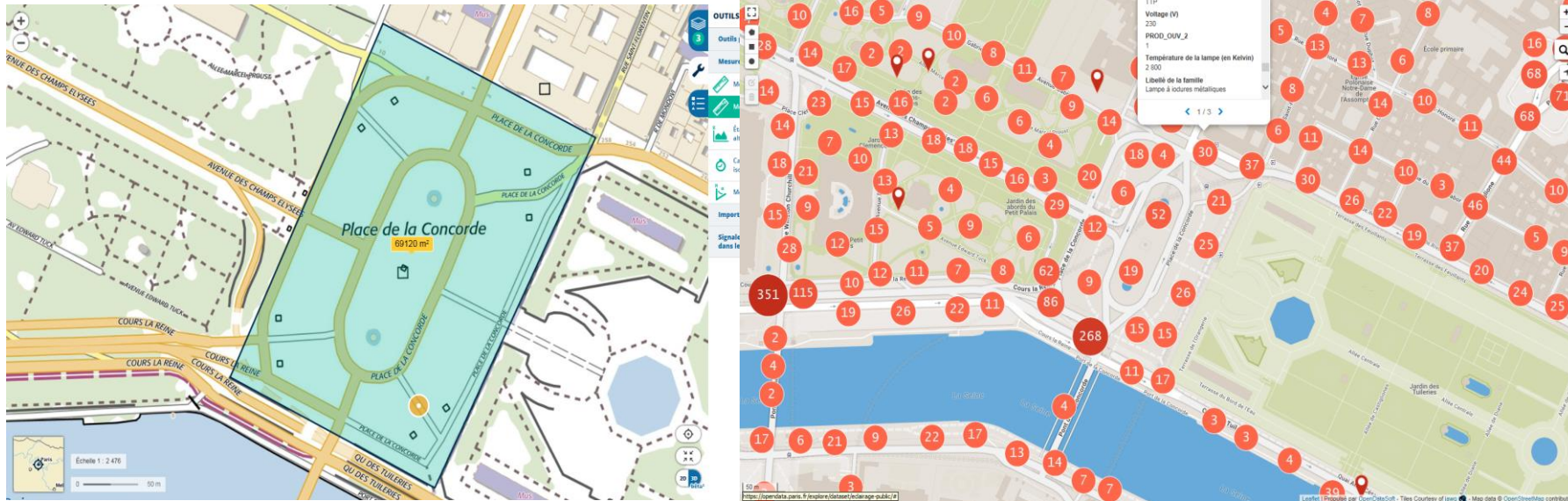
4 % of downward emitted in this zone

24 % of downward emitted in this zone

Emission de lumière 1 / LDC polaire



Installed luminous flux density : example (Place de la Concorde, Paris)



Surface à éclairer : 69 120 m²

360 luminaires avec **lampes iodure de 7230 lm**
= 2 602 800 lm

Installed luminous flux density = 2 602 800 / 69 120 = 38 lm/m²

Place de la Concorde



© Pierre Brunet, association FNE

Lighting zones

Requirements were set for an existing repartition of the French territory:

- « **Agglomération** » = within city limits
- « **hors agglomération** » = outside city limits

Special requirements were set for listed natural areas (national and regional parks, marine reserves, etc.) and astronomical sites

Pathways, street and road lighting requirements

- No requirement on lighting schedule in general, except when lighting is part of a zone of economic activity located in a enclosed area. In this special case :
 - Switch off before 1 am or 1 h after the end of activities if they stop after 1 am
 - Switch on after 7 am or 1 h before the beginning of activities if they begin before 7 am
- $ULR < 1\%$ and in situ $ULR_{\alpha} < 4\%$
- $FC3 > 95\%$
- $CCT < 3000\text{ K}$ within city limits and outside city limits
- $CCT < 2700\text{ K}$ or 2400 K in listed natural areas
- Installed lumen / m^2 :
 - $< 35\text{ lm}/m^2$ within city limits
 - $< 25\text{ lm}/m^2$ outside city limits
- Illuminance should not exceed 20 lux on areas accessible to disabled people

Consequences of lm/m^2 limits

Mean illuminance (lx) = lm/m^2 . Maintenance factor . Utilance

Best utilance for LED street/road lighting luminaire : 0.6

Best maintenance factor : 0.9

With $35 \text{ lm}/\text{m}^2$, it is not possible to exceed a mean illuminance of 19 lx
 $25 \text{ lm}/\text{m}^2$, it is not possible to exceed a mean illuminance of 13 lx

Several EN 13201 lighting classes cannot be used any more :

C0 : 50 lx

C1 : 30 lx

C2 : 20 lx

C3 : 15 lx

M1 : $2 \text{ cd}/\text{m}^2$ (30 lx)

M2 : $1.5 \text{ cd}/\text{m}^2$ (20 lx)

M3 : $1 \text{ cd}/\text{m}^2$ (10 lx)

P1 : 15 lx

Parking lots

- No required lighting schedule for isolated parking lots
- When parking lots are attached to a zone of economic activities :
 - Switch on after sunset
 - Switch off 2 hours after the end of activities
- Possible lighting in the morning after 7 am or 1 hour before activities if they start earlier
- $ULR < 1\%$ and in situ $ULR_{\alpha} < 4\%$
- $FC3 > 95\%$
- CCT $< 3000\text{ K}$
 $< 2700\text{ K}$ or 2400 K in listed natural areas
- Installed lumen / m^2 : $< 25\text{ lm}/m^2$ within city limits
 $< 20\text{ lm}/m^2$ outside city limits

- illuminance should not exceed 20 lux when parking lots are accessible to disabled people

Heritage Lighting « *patrimoine* »

« Heritage » is defined as places having historical, artistic, archeological, esthetical, scientific or technical interest.

- Switch on after local sunset
- Switch off at 1 am
- No requirement on ULR
- No requirement on FC3 n°3
- No requirement on CCT
- No requirement on installed lumen /m²

Parks and gardens accessible to the public or belonging to a company, a social housing authority or a collective housing

- Switch on after local sunset
- Switch off within one hour after closing time
- No requirement on ULR
- No requirement on FC3
- No requirement on CCT, except in listed natural areas (CCT < 2400 K)
- Installed lumen / m² : < 25 lm/m² within city limits
< 10 lm/m² outside city limits

Lighting of outdoor sport facilities

- CCT < 2400 K in listed natural areas
- No other requirements

Illumination of non-residential buildings (facade lighting only)

- Switch-on after sunset
- Switch-off time before 1 am
- No requirement on ULR and FC3
- CCT < 3000 K
- CCT < 2700 K or 2400 K in listed natural areas
- Installed lumen / m² : < 25 lm/m² within city limits
< 20 lm/m² outside city limits
The surface area (m²) is the facade area to illuminate

Indoor lighting of professional premises when luminaires are voluntary installed to emit light outside the buildings

- Switch off before 1 am or 1 hour after the end of activities if they stop after 1 am
- Switch on after 7 am or 1 h before the beginning of activities if they begin before 7 am
- CCT < 3000 K
- CCT < 2700 K or 2400 K in listed natural areas
- No other requirements

Lighting of commercial showcases

- Switch off before 1 am or 1 hour after the end of activities if they stop after 1 am
- Switch on after 7 am or 1 h before the beginning of activities if they begin before 7 am
- No other requirements

Lighting of temporary events

- Switch on after sunset
- Switch off at 1 am or 1 hour after end of event
- In protected natural areas and astronomic sites:
 - Ban of « light canons » with flux > 100 000 lm
 - Ban of recreational laser beams in listed natural areas and astronomical sites
 - Applicable from Jan 1st, 2019

Lighting of construction works

if labor code is not infringed:

- Switch on after sunset
- Switch off within one hour following the end of activities
- CCT < 3000 K in listed natural areas

Rivers, lakes, seas

- Lighting installations must not be directed towards the waters, except when in working areas, industrial zones, transportation routes
- New lighting installations must be not be visible from the sea
- Applicable from Jan 1st, 2019

Intrusive lighting

- No excessive intrusive light must be emitted in residential premises, whatever the lighting source
- No limits are given in the law

Possible derogations

- Schedules requirements can be adapted when using presence sensors and daylight sensors.
- Possible derogation of the Mayor concerning the switch-off time of heritage, park, garden lighting during the day before a holiday and during Christmas illuminations.
- Possible derogation of prefects concerning the switch-off time during exceptional events or in designated touristic zones
- Prefects can require more stringent criteria to protect sensitive animal or vegetal species.
- Municipalities located within the perimeter of listed astronomical sites may deviate from the temporality, ULR and CIE flow code and color temperature requirements if they implement a light pollution control plan to guarantee the prevention, limitation and suppression of light pollution that can prevent the astronomical observation activities of these sites. This plan must demonstrate that the technical choices proposed make it possible to obtain results equivalent to those obtained by complying with the requirements of this law.

Regulation schedule

All new lighting installations operating after 1st January 2020 must comply

For existing lighting installations:

- **From January 1st, 2019**
 - Switch-on/switch-off times requirements apply to non-residential buildings (indoor and facade lighting) except when an extra electrical circuit is required
- **Before January 1st, 2020**
 - All existing luminaires (of all concerned categories) that can be tilted downwards must be mechanically adjusted to reach ULR=0 (no light emitted upward)
- **Before January 1st, 2021**
 - All switch-on/switch-off schedule requirements must be applied for all the concerned categories
- **Before January 1st, 2025**
 - All luminaires (of all concerned categories) with **ULR>50%** (most recessed floor luminaires, most spheres and cylinders, etc.) must be replaced by compliant luminaires

Luminaires to be replaced before 1st January 2025

Tous les luminaires (de toutes les catégories concernées) avec **ULR > 50%** doivent être remplacés par des luminaires conformes.



Compliance / Control / Enforcement

- For public lighting : control and enforcement will be done by government inspectors (no one yet has been designated)
- For private lighting : control and enforcement are the responsibility of the mayor
- Lighting managers must provide all technical data concerning their installations:
 - Luminaire data : ULR, CIE flux code, CCT, luminous flux, installation date
 - Maps of illuminated surfaces : identification of lighted areas and evaluation of the lighted surfaces in m^2 in order to compute the installed lm/m^2 values
- Possible visual control of luminaire tilt angle, search for evidence of upward light (no detail given in the law)