

Exterior Lighting

Modify the 2021 International Energy Conservation Code as follows:

Revise as follows:

C405.5.1 Total connected exterior building exterior lighting power.

The total exterior connected lighting power shall be the total maximum rated wattage of all lighting that is powered through the energy service for the building.

1. Lighting *approved* because of safety considerations.
2. Emergency lighting automatically off during normal business operation.
- ~~3.~~ ~~Exit signs.~~
- ~~4.~~3. Specialized signal, directional and marker lighting associated with transportation.
- ~~5.~~4. Advertising signage or directional signage.
- ~~6.~~5. Integral to equipment or instrumentation and installed by its manufacturer.
- ~~7.~~6. Theatrical purposes, including performance, stage, film production and video production.
- ~~8.~~7. Athletic playing areas.
- ~~9.~~8. Temporary lighting.
- ~~10.~~9. Industrial production, material handling, transportation sites and associated storage areas.
- ~~11.~~10. Theme elements in theme/amusement parks.
- ~~12.~~11. Used to highlight features of art, public monuments and the national flag.
- ~~13.~~12. Lighting for water features and swimming pools.
- ~~14.~~13. Lighting controlled from within dwelling units, where the lighting complies with Section R404.1.

TABLE C405.5.2(1) EXTERIOR LIGHTING ZONES

LIGHTING ZONE	DESCRIPTION
1	Developed areas of national parks, state parks, forest land, and rural areas
2	Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use and residential mixed-use areas
3	All other areas not classified as lighting zone 1, 2 or 4
4	High-activity commercial districts in major metropolitan areas as designated by the local land use planning authority

Revise as follows:

TABLE C405.5.2(3) INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS

LIGHTING ZONES				
	Zone 1	Zone 2	Zone 3	Zone 4
Building facades	No allowance	0.075 W/ft ² of gross above-grade wall area	0.113 W/ft ² of gross above-grade wall area	0.15 W/ft ² of gross above-grade wall area
Automated teller machines (ATM) and night depositories	43589.9 W per location plus 4534.9 W per additional ATM per location			
Uncovered entrances and gatehouse inspection stations at guarded facilities	0.50 0.1439 W/ft ² of area	0.500 0.2519 W/ft ² of area	0.500 0.3599 W/ft ² of area	0.500 0.5039 W/ft ² of area
Uncovered loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.35 0.1039 W/ft ² of area	0.350 0.1819 W/ft ² of area	0.350 0.2599 W/ft ² of area	0.350 0.3639 W/ft ² of area
Drive-up windows and doors	200 52.9 W per drive through	200 91.9 W per drive through	200 131.9 W per drive through	200 184.9 W per drive through
Parking near 24-hour retail entrances.	400 79.9 W per main entry	400 139.9 W per main entry	400 199.9 W per main entry	400 279.9 W per main entry

For SI: 1 watt per square foot = W/0.0929 m².

W= watts

Reason:

Many elements in exterior lighting have changed since this section was last modified in the 2018 version. In 2018, lighting fixture device efficacy ranged 80 - 100 lm/W. Since 2018, exterior lighting device efficacy has increased by 20 - 40%. Many exterior lighting devices now exceed 120 lm/W. It is very hard to purchase equipment with efficacy values that low. As a result, the lighting power density values can be reduced in response to the current technology available.

Design practices and research also changed since 2018. In 2018, lighting knowledge about LEDs was still somewhat unknown. At the time, practices were assuming significant degradation assumption in the calculations. Now, industry assumes a degradation of about 15%. This also allows for a reduction in lighting power density through newer guidance on design calculations.

In 2019, the Illuminating Engineering Society (IES) conducted research post 2018 related to exterior lighting. This proposal reflects the revised guidance developed from this new IES research. As a result of the new lighting guidance, certain levels that were previously recommended were now no longer recommended. This proposal aligns with new research from the IES and allows for lower lighting power density values.

Finally, this version first addresses lighting zones. The concept of a lighting zone is that less light is needed because of the adaption state of the eye. Lighting zone 1 is national parks, forest land, rural areas, etc. Lighting Zone 4 is heavy commercial districts like Times Square and the Las Vegas strip. More light is needed in lighting zone 4 than 1 to account for the ambient brightness of the environment. These changes provide values per lighting zone. For example, the previous version had the same value for drive-up windows independent of lighting zone. However, if following good lighting practices, less light (and thus less power) should be provided in lighting zone 1 than 4. This proposed change makes sure that the values ascend based on lighting zone.

This proposal also reflects changes in both lighting technology and practices that allow for lower lighting power density values. The proposed values are similar to those considered in ANSI/ASHRAE/IES Standard 90.1-2022 as well as Washington State Energy Code.

Cost Impact:

The code change proposal will neither increase nor decrease the cost of construction.

This proposal is similar to an ANSI/ASHRAE/IES Standard 90.1 addendum. The 90.1 addendum met the Std. 90.1 scalar ratio. Exterior lighting fixture prices were surveyed. Prices were supplied by a third party and have remained relatively flat related over the last 5 years independent of the efficacy of the fixtures. Prices have remained flat while efficacy improved. Therefore, costs will not increase in response to this proposal.