**CEPI-189-21**

IECC®: C405.5.1, TABLE C405.5.2(3)

Proponents:

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**2021 International Energy Conservation Code**

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.

Exception: Lighting used for the following applications shall not be included.

1. **Lighting *approved* because of safety considerations.**
2. **Emergency lighting automatically off during normal business operation.**
3. **Exit signs.**

4. Specialized signal, directional and marker lighting associated with transportation.

5. Advertising signage or directional signage.

6. Integral to equipment or instrumentation and installed by its manufacturer.

7. Theatrical purposes, including performance, stage, film production and video production.

8. Athletic playing areas.

9. Temporary lighting.

10. Industrial production, material handling, transportation sites and associated storage areas.

11. Theme elements in theme/amusement parks.

12. Used to highlight features of art, public monuments and the national flag.

13. Lighting for water features and swimming pools.

14. Lighting controlled from within dwelling units, where the lighting complies with Section R404.1.

TABLE C405.5.2(2) LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **LIGHTING ZONES** | | | | |
|  | **Zone 1** | **Zone 2** | **Zone 3** | **Zone 4** |
| **Base Site Allowance** | ~~350~~ 160 W | ~~400~~ 280 W | ~~500~~ 400 W | ~~900~~ 560 W |
| **Uncovered Parking Areas** | | | | |
| **Parking areas and drives** | ~~0.03~~ 0.015 W/ft2 | ~~0.04~~ 0.026 W/ft2 | ~~0.06~~ 0.037 W/ft2 | ~~0.08~~ 0.052 W/ft2 |
| **Building Grounds** | | | | |
| Walkways and ramps ~~less than 10 feet wide~~ | 0.50 W/linear foot | 0.50 W/linear foot | ~~0.60~~ 0.55 W/linear foot | ~~0.70~~ 0.60 W/linear foot |
| ~~Walkways and ramps 10 fee wide or greater,~~ plaza areas, ~~special feature areas~~ | ~~0.10~~ 0.028 W/ft2 | ~~0.10~~ 0.049 W/ft2 | ~~0.11~~ 0.070 W/ft2 | ~~0.14~~ 0.098 W/ft2 |
| Roof terraces and special features | 0.04 W/ft2 | 0.07 W/ft2 | 0.10 W/ft2 | 0.14 W/ft2 |
| Dining areas | ~~0.65~~ 0.156 W/ft2 | ~~0.65~~ 0.273 W/ft2 | ~~0.75~~ 0.390 W/ft2 | ~~0.95~~ 0.546 W/ft2 |
| Stairways | ~~0.60 W/ft~~~~2~~  Exempt | ~~0.70 W/ft~~~~2~~  Exempt | ~~0.70 W/ft~~~~2~~  Exempt | ~~0.70 W/ft~~~~2~~  Exempt |
| Pedestrian tunnels | ~~0.12~~ 0.063 W/ft2 | ~~0.12~~ 0.110 W/ft2 | ~~0.14~~ 0.157 W/ft2 | ~~0.21~~ 0.220 W/ft2 |
| Landscaping | ~~0.03~~ 0.014 W/ft2 | ~~0.04~~ 0.025 W/ft2 | ~~0.04~~ 0.036 W/ft2 | ~~0.04~~ 0.050 W/ft2 |
| **Building Entrances and Exits** | | | | |
| Pedestrian and vehicular entrances and exits | ~~14~~ 5.6 W/linear foot of opening | ~~14~~ 9.8 W/linear foot of opening | ~~21~~ 14.0 W/linear foot of opening | ~~21~~ 19.6 W/linear foot of opening |
| Entry canopies | ~~0.20~~ 0.072 W/ft2 | ~~0.25~~ 0.126 W/ft2 | ~~0.40~~ 0.180 W/ft2 | ~~0.40~~ 0.252 W/ft2 |
| Loading Docks | ~~0.35~~ 0.104 W/ft2 | ~~0.35~~ 0.182 W/ft2 | ~~0.35~~ 0.260 W/ft2 | ~~0.35~~ 0.364 W/ft2 |
| **Sales Canopies** | | | | |
| Free-standing and attached | ~~0.40~~ 0.20 W/ft2 | ~~0.40~~ 0.35 W/ft2 | ~~0.60~~ 0.50 W/ft2 | 0.70 W/ft2 |
| **Outdoor Sales** | | | | |
| Open areas (including vehicle sales lots) | ~~0.20~~ 0.072 W/ft2 | ~~0.20~~ 0.126 W/ft2 | ~~0.35~~ 0.180 W/ft2 | ~~0.50~~ 0.252 W/ft2 |
| Street frontage for vehicle sales lots in addition to “open area allowance” | No allowance | ~~7~~ 7.2 W/linear foot | ~~7~~ 10.3 W/linear foot | ~~21~~ 14.4 W/linear foot |

~~For SI: 1 foot = 304.8 mm, 1 watt per square foot = 0.0929 m2. W = watts.~~ For SI: 1 foot = 304.8 mm, 1 watt per square foot = 10.76 W/m2. W = watts.

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/ft2 of gross above-grade wall**  **area** | **0.113 W/ft2 of gross above-grade wall**  **area** | **0.15 W/ft2 of gross above-grade wall**  **area** |
| **Automated teller machines (ATM) and night**  **depositories** | **~~135~~** 90 **W per location plus ~~45~~** 35 **W per additional ATM per location** | | | |
| **Uncovered entrances and gatehouse inspection stations at guarded facilities** | **~~0.50~~** 0.144  **W/ft2 of area** | **~~0.50~~**0.252 W**/ft2 of**  **area** | **~~0.50~~**0.360 **W/ft2 of**  **area** | **~~0.50~~**0.504 **W/ft2 of**  **area** |
| **Uncovered loading areas for law enforcement, fire, ambulance and other emergency service**  **vehicles** | **~~0.35~~** 0.104  **W/ft2 of area** | **~~0.35~~**0.182 **W/ft2 of**  **area** | **~~0.35~~**0.260 **W/ft2 of**  **area** | **~~0.35~~**0.364 **W/ft2 of**  **area** |
| **~~Drive-up windows and doors~~** | **~~200 W per drive through~~** | | | |
| Drive-up windows and doors | **~~200~~** 53 **W**  **per drive through** | **~~200~~** 92 **W per**  **drive through** | **~~200~~** 132 **W per**  **drive through** | **~~200~~** 185 **W per**  **drive through** |
| **~~Parking near 24-hour retail entrances~~** | **~~400 W per main entry~~** | | | |
| Parking near 24-hour retail entrances | **~~400~~** 80 **W**  **per main entry** | **~~400~~** 140 **W per**  **main entry** | **~~400~~** 200 **W per**  **main entry** | **~~400~~**280 **W per**  **main entry** |

For SI: 1 watt per square foot = 10.76 W/~~0.0929~~ m2. W = watts.

Reason Statement:

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.