

Exterior Lighting Power Requirements in the National Energy Codes

Recently, the ASHRAE/IESNA 90.1 Lighting Subcommittee developed a new set of exterior lighting power density requirements that are included in the 2004 version of the standard and have been adopted in the IECC 2006 version. These requirements encourage the use of efficient technologies as well as effective design and application of exterior lighting. As states adopt these codes, the requirements will become part of most state energy code for buildings.

The following discussion provides details on the control, efficacy, and power density requirements for exterior lighting in ASHRAE/IESNA 90.1-2004 and IECC 2006.

Controls

Automatic controls must be included that are capable of turning off exterior lighting when sufficient daylight is available or when the lighting is not required during nighttime hours. Exterior lighting not designated for dusk-to-dawn operation must be controlled by an astronomical time switch. Lighting designated for dusk-to-dawn operation shall be controlled by an astronomical time switch. Astronomical time switches must have battery back-up capability for at least 10 hours.

Exemptions: Covered vehicle entrances or exits from buildings or parking structures where safety, security, or eye adaptation are a concern.





Efficacy

The lamps used in exterior building grounds luminaires must meet minimum efficacy levels of 60 lumens per watt but only for lamps operating at greater than 100 watts.

Exemptions: Lighting controlled by an occupancy sensor and lighting listed as exempted in the Power Density section.

Power Density

Lighting power density for exterior applications is limited based on square footage of illuminated area or perimeter length. These requirements are split into tradable and non-tradable applications. Tradable applications work like the familiar interior lighting power limits in that it is the total wattage for all of the applications compared to the total wattage allowance for the building that is important for compliance. Non-tradable applications are individual limits associated with specific lighted features that cannot be combined or "traded" with others. Some design flexibility is provided with an additional unrestricted allowance of 5% of the total designed wattage to be used wherever desired.

Exemptions:

- Specialized signal, directional, and marker lighting associated with transportation.
- Advertising signage or directional signage and temporary lighting.
- Lighting integral to equipment that is installed by its manufacturer.
- Lighting for theatrical purposes: performance, stage, film/video production.
- Lighting for athletic playing areas and theme elements in amusement parks.
- Lighting for industrial production, material handling, transportation sites, and associated storage areas.
- Lighting used to highlight features of public monuments and registered historic landmark structures or buildings.

Compliance with the lighting power density requirement is achieved when the total designed wattage (not including the 5% adder or exempted lighting) is not greater than the total wattage allowance calculated for both tradable and nontradable applications in ASHRAE 90.1-2004, Table 9.4.5.

ASHRAE 90.1-2004, Table 9.4.5 Lighting Power Densities for Building Exteriors

Tradable Surfaces		
Uncovered Parking Areas --Parking Lots and drives		0.15 W/ft²
Building Grounds --Walkways less than 10 feet wide		1.0 W/linear foot
Building Grounds --Walkways 10 feet wide or greater; Plaza areas; Special Feature Areas		0.2 W/ft²
Building Grounds --Stairways		1.0 W/ft²
Building Entrances and Exits --Main entries		30 W/linear foot of door width
Building Entrances and Exits --Other doors		20 W/linear foot of door width
Canopies and Overhangs --free standing		1.25 W/ft²



and attached	
Outdoor Sales --Open areas (including vehicle sales lots)	0.5 W/ft²
Outdoor Sales --Street frontage for vehicle sales lots in addition to "open area" allowance	20 W/linear foot

Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas may be traded.

Non-Tradable Surfaces	
Building Facades	0.2 W/ft² for each illuminated wall or surface or 5.0 W/linear foot for each illuminated wall or surface length
Automated teller machines and night depositories	270 W per location plus 90 W per additional ATM per location
Entrances and gatehouse inspection stations at guarded facilities	1.25 W/ft² of uncovered area (covered areas are included in the "Canopies and Overhangs" section of "Tradable Surfaces")
Loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.5 W/ft² of uncovered area (covered areas are included in the "Canopies and Overhangs" section of "Tradable Surfaces")
Drive-up windows at fast food restaurants	400 W per drive-through
Parking near 24-hour retail entrances	800 W W per main entry

Lighting power density calculations for these applications can be used only for the specific application and cannot be traded between surfaces or with other exterior lighting. These allowances are in addition to any allowance otherwise permitted in the "tradable Surfaces" section of this table.