



U.S. Department of Energy
Energy Efficiency and Renewable Energy



Building Energy Codes

Lighting Energy Codes and Standards - Common Compliance Issues -

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Common Compliance Issues

- What's the issue?
 - Some background
 - Why is it an issue?

- Application/interpretation guidance
 - What's the intent
 - What's a reasonable and practical application

- Will cover ASHRAE/IESNA 90.1-2004, IECC 2003, and IECC 2006 where applicable

Additional Interior Lighting Power

1. *Decorative luminaires in addition to general lighting equipment - 1.0 W/ft² (90.1- 2004, IECC 2003 only)*
2. *Specific luminaires to eliminate computer screen glare - 0.35 W/ft² (90.1- 2004, IECC 2003 only)*
3. *Retail display lighting:
Additional 1.6 W/ft² , or
Additional 3.9 W/ft² for valuable/fine merchandise*
4. *Medical space lighting – 1.0 W/ft² (IECC 2003 only)*

Additional Interior Lighting Power

1. *Decorative luminaires in addition to general lighting equipment - 1.0 W/ft² (90.1- 2004, IECC 2003 only)*

- Intent: apply to separately switched lighting specifically intended for decoration (not for primary illumination)
- Common applications: Chandeliers, decorative sconces, exhibit highlights
- Application Issues:
 - Applicable area?
 - Chandelier - generally entire area
 - Sconces - generally perimeter strip or wall area
 - Lighting for both illumination and decoration?
 - Intended to be separate from general lighting
 - Luminaire type (i.e. “decorative”) does not trigger allowance

Additional Interior Lighting Power

2. *Specific luminaires to eliminate computer screen glare - 0.35 W/ft² (90.1- 2004, IECC 2003 only)*

- Intent: apply to lighting designed to meet IESNA guidance for computer screen glare (avg. vertical luminance limits)
- Common applications: Computer office environment - generally ceiling grid troffer type luminaires
- Application Issues:
 - Not typically needed in modern design - but still claimed!

Additional Interior Lighting Power

3. Retail display lighting: Additional 1.6 W/ft² or 3.9 W/ft² for valuable/fine merchandise

- Intent: apply to separately switched and directed (aimed) lighting specifically intended for highlighting merchandise
- Common applications: track, spotlights, shelf mounted
- Application Issues:
 - “Valuable”, “Fine”, and specifically Listed merchandise for 3.9 allowance
 - 90.1-2004: ..”valuable”...such as jewelry, fine apparel and accessories, china and silver, art, and similar items **where detailed display and examination...are important.**
 - IECC 2003, 2006: ..”fine”...such as jewelry, fine apparel and accessories, or china and silver.



Additional Interior Lighting Power

3. *Retail display lighting: Additional 1.6 W/ft² or 3.9 W/ft² for valuable/fine merchandise*

➤ More...Application Issues:

- Applicable area?
 - “area of specific display” (90.1-2004 for both allowances)
 - “case or shelf area” (IECC 2003, 2006 for 3.9 allowance)
 - Walls? – yes - area covered with visible merchandise
 - Mannequins and other non-standard display? - yes - footprint of display
- IECC 2006: adds 50% **floor area** limit to 1.6 allowance

Retail display allowances will be completely revised for
90.1-2007

Additional Interior Lighting Power

4. *Medical space lighting – 1.0 W/ft² (IECC 2003 only)*

- Intent: general allowance for any lighting in specific medical related spaces
- Common applications: emergency, recovery, medical supply, and pharmacy
- Application Issues:
 - Definition of spaces

Questions?
Comments?

Automatic Building Lighting Shutoff

Capability to automatically shut off all building lighting

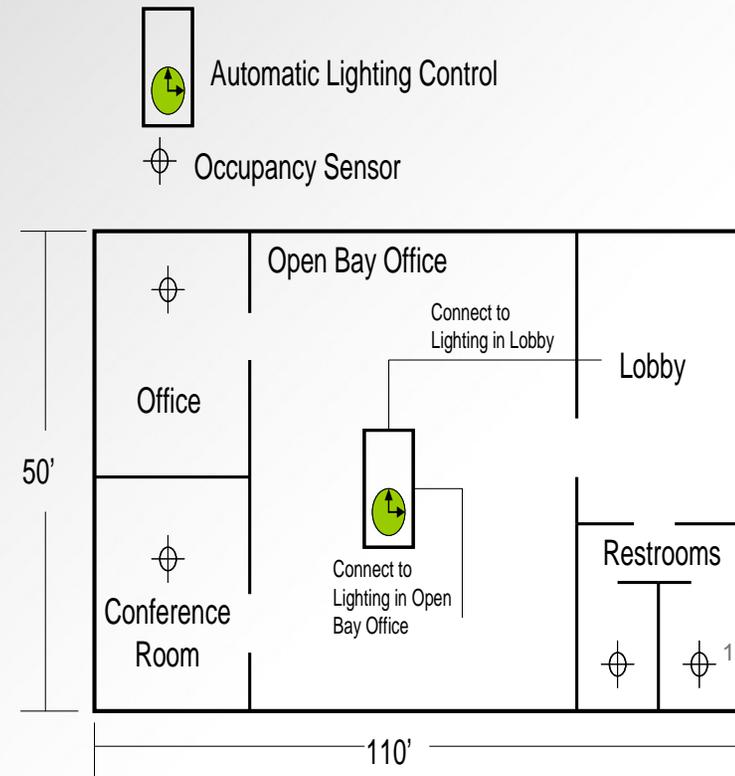
- Intent: automatic shutoff for all lighting in buildings (business entities) over 5000 ft² based on: time-of-day program, or occupant sensor, or similar control.
- Application Issues:
 - “by occupant intervention” typo (IECC 2003 only)
 - Strip mall and similar business entities with < 5000 ft² tenants
 - Intent is based on cost-effectiveness of 5000 ft² cutoff
 - Reasonable application is metered business entity

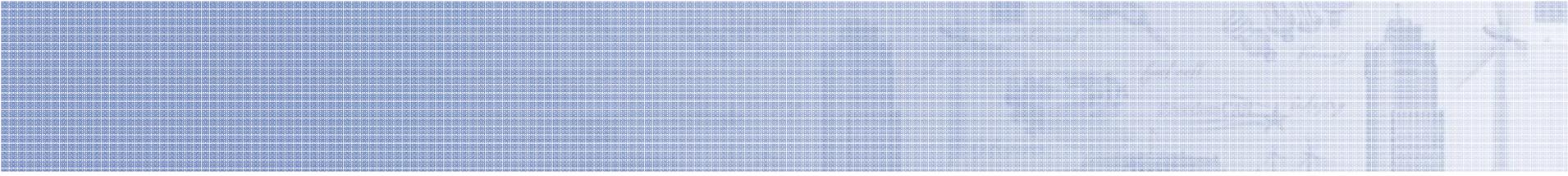


Automatic Building Lighting Shutoff

➤ More...Application Issues:

- Exceptions: 24-hour operation, patient care, safety/security of room/occupants
 - Exist in IECC 2006/90.1-2004 only
 - None in IECC 2003
- Control mixing?
 - Time-of-day
 - occupancy sensor
 - both? - Yes!





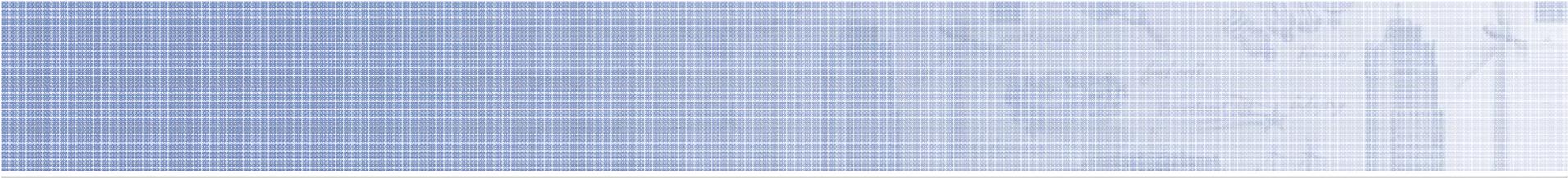
Questions?
Comments?

Building/Space Type Matching

Issue: “my building/space type is not on the lists”

- Intent: use closest match possible based on lighting needs for the function of the space or building type

- Application:
 - Identify building or space type with similar functions or similar lighting needs
 - Document the rationale for the choice
 - Common space/building types of interest:
 - Laboratory - not in IECC - use alternate 90.1
 - Salon/Barber shop/Hairdresser – office or retail - how is it lighted?
 - Data Center - office
 - Assisted Living - dwelling units, nurses station (90.1)



Questions?
Comments?

Expanded Exterior LPD Limits

- Currently in 90.1-2004 and IECC 2006
- Previous version requirements (IECC 2003) are basic
 - Lamp efficacy (90.1 was 60 lm/W, IECC at 45 lm/W)
 - Limited LPDs (90.1 had entrance/exit/façade, IECC – NA)
 - Controls
- Expanded requirements cover all expected exterior applications
- Include “tradeable” and “non-tradeable” limits
- Like any list of “spaces” or “applications” - interpretation may be required.....



Building Exteriors LPDs (Tradable)

Applications	Lighting Power Densities
Tradable Surfaces	
(Lighting Power Densities for open parking areas, building grounds, building entrances and exits, canopies and overhangs, and outdoor sales areas may be traded)	
Uncovered Parking Areas	
Parking Lots and drives	0.15 W/ft ²
Building Grounds	
Walkways less than 10 feet wide	1.0 Watts/linear foot
Walkways 10 feet wide or greater, Plazas, Special feature areas	0.2 W/ft ²
Stairways	1.0 W/ft ²
Building Entrances and Exits	
Main Entries	30 Watts/linear foot of door width
Other doors	20 Watts/linear foot of door width
Canopies and Overhangs	
Canopies (free standing & attached) and overhangs	1.25 W/ft ²
Outdoor Sales	
Open areas (including vehicle sales lots)	0.5 W/ft ²
Street Frontage for vehicle sales in addition to "open area"	20 Watts/linear foot

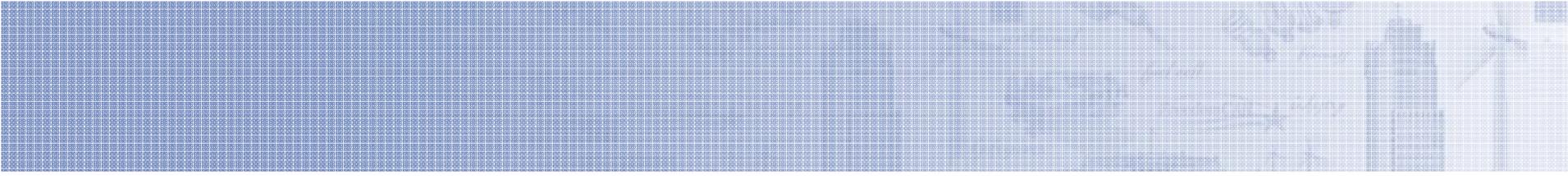
Building Exteriors LPDs (Non-Tradable)

Applications	Lighting Power Densities
Non-Tradable Surfaces (Lighting Power Density calculations for the following applications can only be used for the specific application and cannot be traded between surfaces or with other exterior lighting. The following allowance's are in addition to any allowance otherwise permitted in the Tradable Surfaces section of this table.)	
Building Facades	0.2 W/ft ² for each illuminated wall or surface or 5.0 Watts/linear foot for each illuminated wall or surface length
Automated Teller Machines & Night Depositories	270 watts per location plus 90 watts per additional ATM per location
Entrances and Gatehouse Inspection Stations at guarded facilities	1.25 W/ft ² 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/ft ² of uncovered area (covered areas are included in the Canopies and Overhangs section of Tradable Surfaces)
Drive-up Windows at Fast Food Restaurants	400 watts per drive-through
Parking near 24-hour Retail Entrances	800 watts per main entry

Expanded Exterior LPD Limits

➤ Application Issues:

- Drive up other than fast food? - same allowance as fast food
- Sales area other than vehicle? - same allowance as vehicle sales
- ATM locations in vestibules - interior? Exterior? - generally if in conditioned space, these are part of interior lighting



Questions?
Comments?