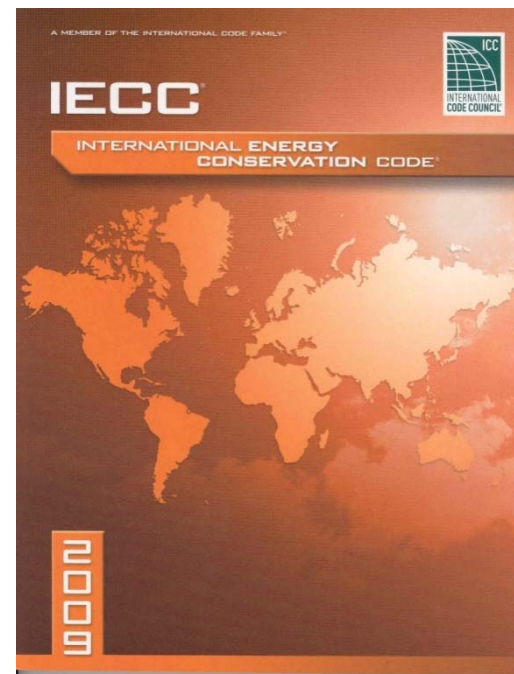


2009 IECC Overview

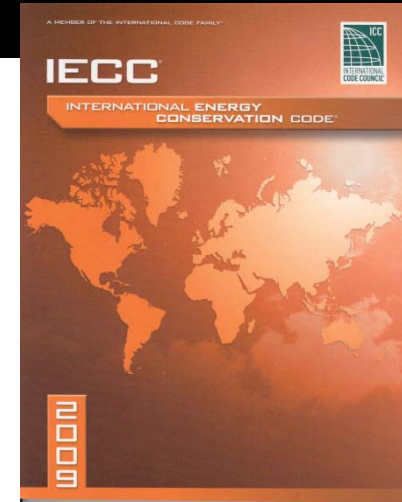


The Family of I-Codes



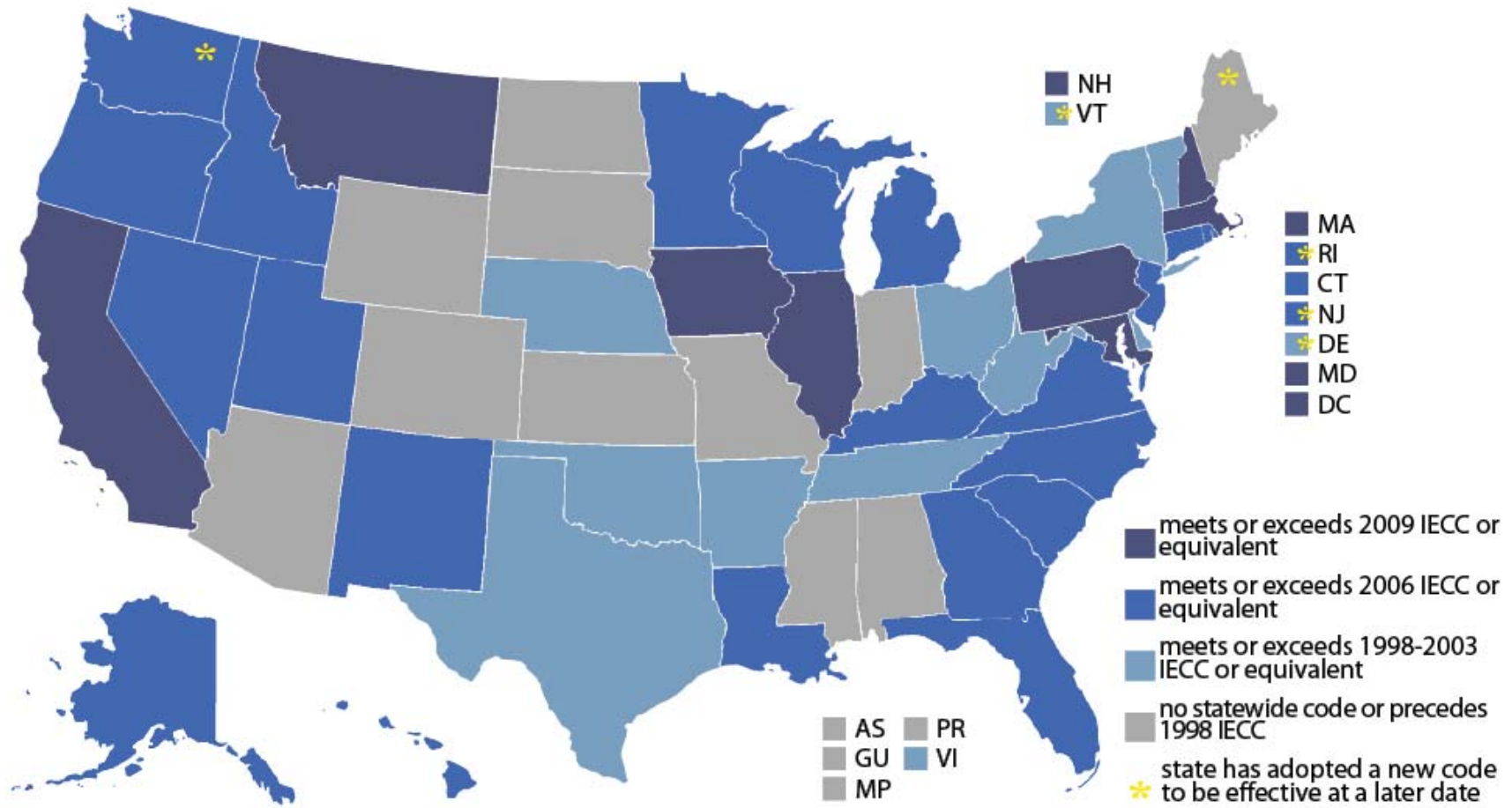
Structure of the IECC

- Chapter 1 Administrative
- Chapter 2 Definitions
- Chapter 3 Climate Zones
- Chapter 4 Residential Energy Efficiency
- Chapter 5 Commercial Energy Efficiency
- Chapter 6 Referenced Standards



Residential State Energy Code Status

AS OF APRIL 1, 2010



 **BCAP** Dedicated to the adoption, implementation, and advancement of building energy codes
 Get all the most up-to-date code status maps and other valuable resources at www.bcap-ocean.org

NOTE:
 These maps reflect only mandatory statewide codes currently in effect.

Residential Changes Since 2006



What's Changed Since IECC 2006?

Stringency – some key differences

New requirements

- ✓ Building Envelope Changes
- ✓ Building envelope tightness
- ✓ Duct testing
- ✓ Lighting equipment
- ✓ Snow melt controls
- ✓ Pool controls and covers

Moisture control requirements moved to IRC

No mechanical trade-offs allowed

Others

Stringency

8 to 10% improvement over the 2006 IECC

Also improvements in clarifications of processes such as the 2009 approved use of latex paints for vapor retarders.

Table 402.1.1

CLIMATE ZONE	FENESTRATION ON U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION ^{b,e} SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPAC WALL R-VALUE
1	1.20	0.75	0.40 0.30	30	13	3 3 / 4	13	0	0	0
2	0.75 0.65 ^j	0.75	0.40 0.30	30	13	4 4 / 6	13	0	0	0
3	0.65 0.50 ^j	0.65	0.40 0.30	30	13	5 5 / 8	19	0 5 / 13 ^f	0	5 / 13
4 except Marine	0.40 0.35	0.60	NR	38	13	5 5 / 10	19	10 / 13	10, 2ft	10 / 13
5 and Marine 4	0.35	0.60	NR	38	19 or 20 or 13+5 ^h	13 13 / 17	30 ^g	10 / 13	10, 2 ft	10 / 13
6	0.35	0.60	NR	49	19 or 20 or 13+5 ^h	15 15 / 19	30 ^g	10 / 13 15 / 19	10, 4 ft	10 / 13
7 and 8	0.35	0.60	NR	49	21	19 19 /	38 ^g	15 / 19	10, 4 ft	10 / 13

Building Envelope Tightness – 402.4.2

Blower Door Testing

If following Compliance
Option 1 (Testing) vs.
Option 2 (Visual
Inspection of Items in
Table 402.4.2)



Duct Testing – 403.2.2

Duct Blaster Testing

Required if any ductwork is outside the building envelope.



Lighting Equipment – 404.1

A minimum of 50% of the lamps in permanently installed lighting fixtures shall be high-efficacy lamps.



Snow Melt Controls – 403.8

Snow- and ice-melting system controls

- ✓ Pavement temperature $> 50^{\circ}\text{F}$ and no precipitation falling and when outdoor temperature is $> 40^{\circ}\text{F}$.



Pool Controls and Covers – 403.9

Pool Heaters

- ✓ with a readily accessible on-off switch
- ✓ fired by natural gas

(not allowed to have continuously burning pilot lights)

Time switches to automatically turn off and on heaters and pumps according to a preset schedule installed on swimming pool heaters and pumps.

Pool covers on heated pools:

- ✓ If heated to $>90^{\circ}\text{F}$, vapor-retardant pool cover at least R-12.

Moisture Control Requirements

Moisture control requirements moved to IRC.

- ✓ R601.3 Vapor retarders
- ✓ R601.3.1 Class III vapor retarders
- ✓ R601.3.2 Material vapor retarder class
- ✓ R601.3.3 Minimum clear air spaces and vented openings for vented cladding

No Mechanical Trade-offs Allowed

Mechanical equipment cannot be used to trade-off against building envelope requirements.



to



Commercial Changes Since 2006



What's Changed Since IECC 2006?

New ASHRAE Standard

Pick Only One Compliance Approach (IECC OR ASHRAE)

Group R for High Rise Residential and Commercial

Latex Paint Allowed as a Vapor Retarder

Snow Melt Controls

Demand Control Ventilation

Fan Power Limitations

Efficient Lighting in Dwelling Units

Daylighting Requirements

Interior Lighting

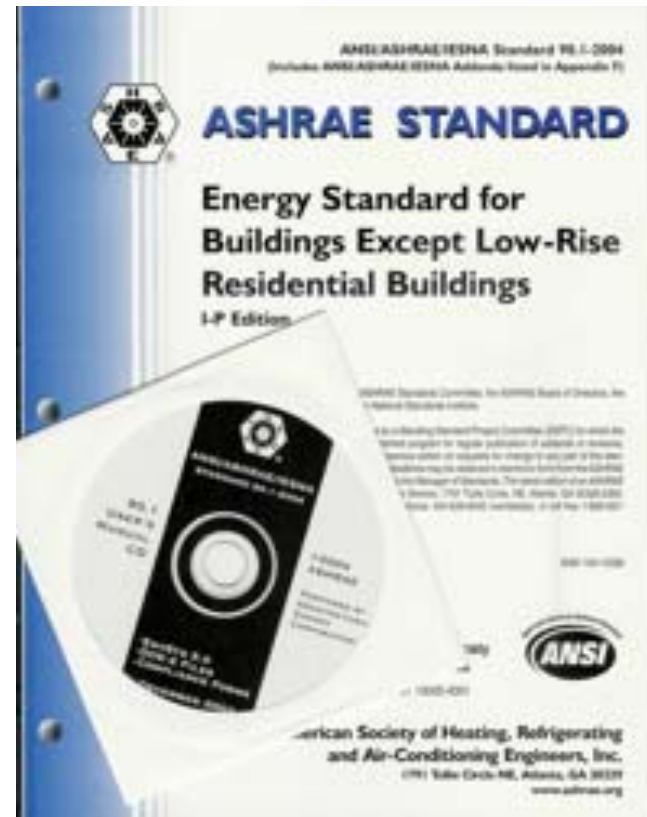
Exterior Lighting Controls

Exterior Lighting Zones and Allowances

New ASHRAE Standard

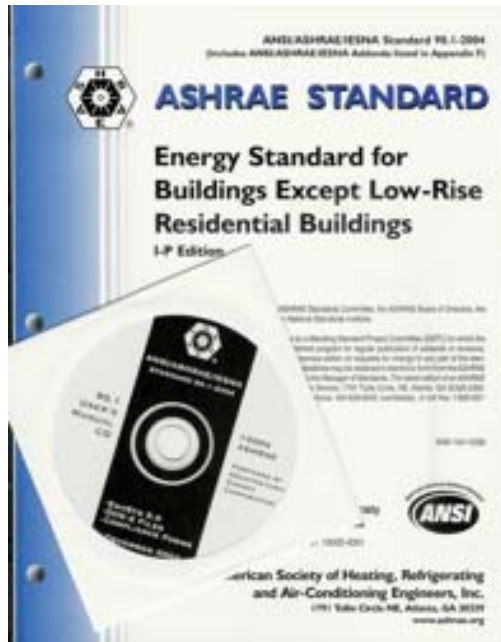
ASHRAE/IESNA Standard 90.1-2007

- ✓ Slight changes to lighting requirements
- ✓ More stringent vestibule requirements

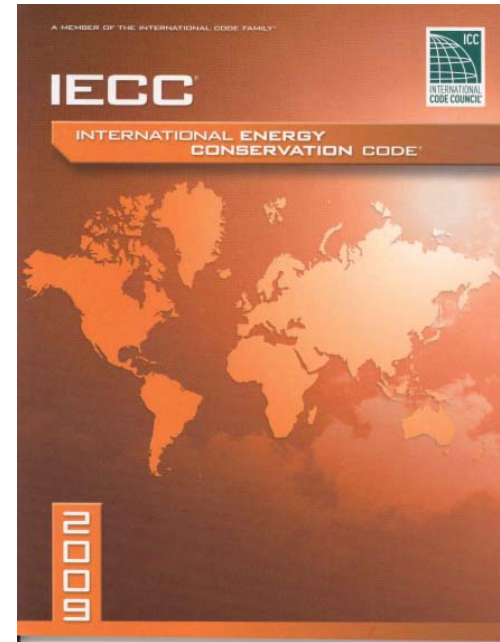


Pick Only One Compliance Approach

Either



OR



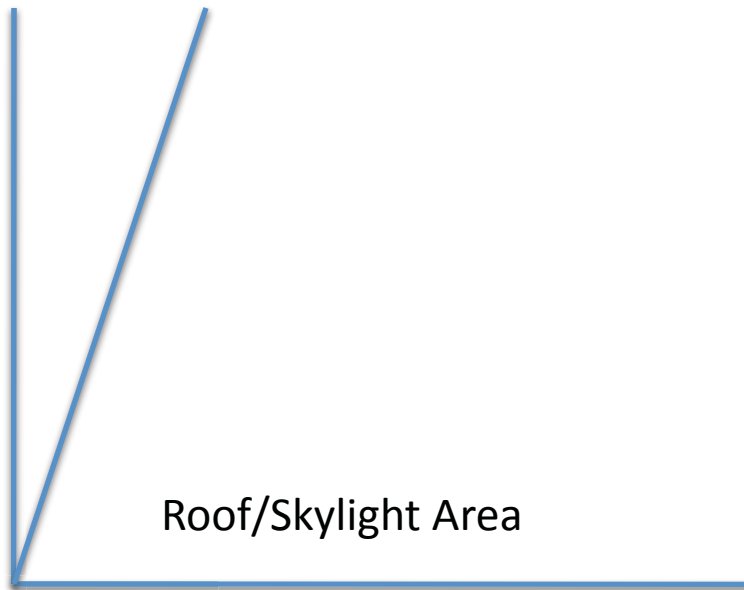
But Not Both

Key Differences – ASHRAE vs. IECC

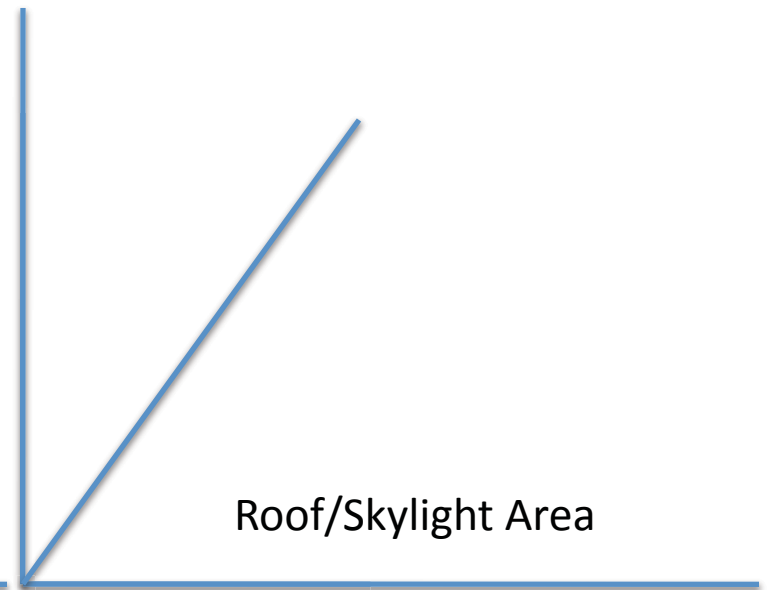
- Definition of “residential” building
- Semi-heated space designation (3.4 Btu/h/ft² up to 15 or 20)
- Glazing within 15 to 30 degrees of vertical & skylight maximums
- Window-to-Wall-Ratio (WWR)
- Provisions for above- and below-grade walls
- Thermal requirements for opaque and non-opaque assemblies
- Allowable maximum U-factor
- Allowable damper leakage rates
- HVAC equipment oversizing
- Operation and Maintenance (O&M) Manuals
- Certain HVAC equipment systems
- Space-by-Space method to lighting power density limits
- Lighting controls, allowances, exceptions and exterior LPDs

IECC Vs. ASHRAE Skylights and Walls

IECC 15 + degrees



ASHRAE 30 + degrees

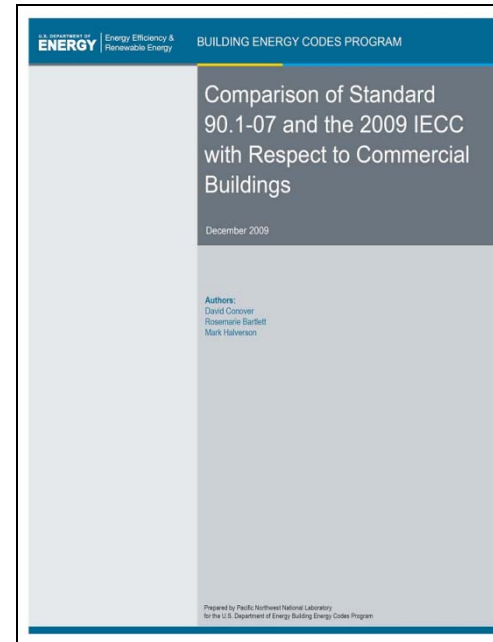


Source

Comparison of Standard 90.1-07 and the 2009 IECC with Respect to Commercial Buildings

Prepared by the Pacific Northwest National Laboratory for the U.S. Department of Building Energy Codes Program

December 2009



http://www.energycodes.gov/publications/research/documents/codes/90-1_iecc_comparison_final_12-16-2009.pdf

Window to Wall Ratio (WWR)

Topic	2006 IECC	2009 IECC
Window area to gross above grade wall area	Section 502.3.1 Allows buildings up to 40% of the window area to gross above grade wall area. Buildings that exceed this level are to use 90.1-2004 or Section 506.	Allows buildings up to 40% of the window area to gross above grade wall area. Buildings that exceed this level are to use Section 506. (90.1 is now the same as IECC 2009)

Group R for High Rise Residential and Commercial

Topic	2006 IECC	2009 IECC
Group R	No Group R designation.	Expands Table 502.2(1) to include a separate category for high-rise residential and commercial occupancies. Increases the insulation requirements for both high-rise residential and commercial in several climate zones.

Table 502.2(1) Climate Zone 5

Table 502.2(1)		
Climate Zone 5 Excerpt		
Building Envelope Requirements - Opaque Assemblies		
	All Other	Group "R"
Roofs		
Insulation Entirely above Deck	R-20, ci	R-20, ci
Metal buildings (with R-5 thermal blocks)	R-13 + R-13	R-19
Attic and other	R-38	R-38
Walls, Above Grade		
Mass	R-11 + R-4, ci	R-13.3, ci
Metal buildings	R-13 + R-5.6 ci	R-13 + R-5.6 ci
Metal framed	R-13 + R-7.5 ci	R-13 + 7.5 c.i.
Wood framed and other	R-13 + R-3.8 ci	R-13 + R-3.8 ci
Walls, Below Grade		
Below grade wall	R-7.5 ci	R-7.5 ci
Floors		
Mass	R-10 ci	R-12.5 ci
Joist/Framing	R-30	R-30
Slab-on-Grade Floors		
Unheated slabs	NR	<u>R-10 for 24" below</u>
Heated slabs	R-15 for 24" below	<u>R-15 for 24" below</u>
Opaque Doors		
Swinging	U-0.50	U-0.50
Roll-up or sliding	U-0.50	U-0.50

Latex Paint Allowed as Vapor Retarder

Topic	2006 IECC	2009 IECC
Moisture Control	Section 502.5 Requires vapor retarders to be installed in unvented framed cavities in Climate Zones greater than 3.	Defines a vapor retarder based on Class (Type 1-3) and allows for the use of latex paint as a vapor retarder based on siding type and Climate Zone.



503.2.4.5 Snow Melt Controls

Topic	2006 IECC	2009 IECC
Snow melt controls	None	Requires snow melt controls on all snow melt equipment installed as part of a commercial project.

503.2.5.1 Demand Control Ventilation

Topic	2006 IECC	2009 IECC
Demand control ventilation	None	Requires demand control ventilation for spaces larger than 500ft ² with an average occupant load of 40 people per 1000ft ² .



503.2.10 Air System Design & Control

Each HVAC system having a total fan system motor nameplate horsepower (HP) exceeding 5 horsepower (HP) (3.7 kW) shall meet the provisions of Sections 503.2.10.1 through 503.2.10.2.



From Classic Engineering Company

503.2.10.1 Fan Power Limitations

Topic	2006 IECC	2009 IECC
Fan power limitations	None	Section 503.2.10 Requires HVAC fan systems greater than 5 hp to meet maximum fan power horsepower requirements.

503.2.11 Heating Outside of Building

Systems installed to provide heat outside a building shall be radiant systems.

Such heating systems shall be controlled by an occupancy sensing device or a timer switch, so that the system is automatically de-energized when no occupants are present.

Efficient Lighting in Dwelling Units

Topic	2006 IECC	2009 IECC
Efficient lighting in dwelling units	None	Section 505.1 Requires at least 50% of the permanently connected lighting in dwelling units to be fitted with high efficacy lamps.



Daylighting Requirements

Daylight Zone Definition:

Under skylights: The area under skylights whose horizontal dimension, in each direction, is equal to the skylight dimension in that direction plus either the floor to ceiling height or the dimension to a ceiling height opaque partition, or one-half the distance to adjacent skylights or vertical fenestration, whichever is least.

Adjacent to vertical fenestration: The area adjacent to vertical fenestration which receives daylight through the fenestration. For purposes of this definition and unless more detailed analysis is provided, the daylight zone depth is assumed to extend into the space a distance of 15 feet or to the nearest ceiling height opaque partition, whichever is less. The daylight zone width is assumed to be the width of the window plus two feet on each side, or the window width plus the distance to an opaque partition, or the window width plus one-half the distance to adjacent skylight or vertical fenestration, whichever is least.

505.5.1 Interior Lighting

Topic	2006 IECC	2009 IECC
<p>Total connected interior lighting power.</p>	<p>505.5.1 Provides five exemptions for lighting used for specialized lighting and associated with life/safety including:</p> <ul style="list-style-type: none"> ▪Specialized lighting for medical and dental. ▪Professional sports arena playing field lighting. ▪Display lighting for exhibits in galleries, museums and monuments. ▪Sleeping unit lighting in hotels, motels, boarding houses or similar buildings. ▪Emergency lighting automatically off during normal building operation. 	<p>Adds exempted lighting that does not need to be considered when calculating the Total Connected Interior Lighting Power including:</p> <ul style="list-style-type: none"> ▪Lighting in spaces specifically designated for use by occupants with special lighting needs including the visually impaired visual impairment and other medical and age-related issues. ▪Lighting in interior spaces that have been specifically designated as a registered interior historic landmark. ▪Casino gaming areas. ▪Lighting for theatrical purposes, including performance, stage, film production and video production. ▪Lighting for photographic processes. ▪Lighting integral to equipment or instrumentation and is installed by the manufacturer. ▪Task lighting for plant growth or maintenance. ▪Advertising signage or directional signage. ▪In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment. ▪Lighting equipment that is for sale. ▪Lighting demonstration equipment in lighting education facilities. ▪Lighting approved because of safety or emergency considerations, inclusive of exit lights. ▪Lighting integral to both open and glass-enclosed refrigerator and freezer cases. ▪Lighting in retail display windows, provided the display area is enclosed by ceiling height partitions. ▪Furniture mounted supplemental task lighting that is controlled by automatic shutoff.

Interior Lighting – 505.5.1.4 Line voltage lighting track

Topic	2006 IECC	2009 IECC
Line-voltage lighting track and plug-in busway	Requires the code user to use either the actual wattage of the fixtures connected to the track lighting or 30 watts/linear feet, whichever is greater, to document the wattage of a track lighting.	Adds two additional options for documenting the wattage or line-voltage lighting, track and plug-in busway lighting that include: <ul style="list-style-type: none">•The wattage limit of the system's circuit breaker, or•The wattage limit of other permanent current limiting device (s) on the system.

Retail Lighting Adjustments

Modifications to Original Proposal

Retail Area 1 = 0.6 W/ft²

Retail Area 2 = 0.6 W/ft²

Retail Area 3 = 1.4 W/ft²

Retail Area 4 = 2.5 W/ft²

Table 505.5.2

TABLE 505.5.2
INTERIOR LIGHTING POWER ALLOWANCES
LIGHTING POWER DENSITY

Building Area Type ^a	(W/ft ²)
Automotive Facility	0.9
Convention Center	1.2
Court House	1.2
Dining: Bar Lounge/Leisure	1.3
Dining: Cafeteria/Fast Food	1.4
Dining: Family	1.6
Dormitory	1.0
Exercise Center	1.0
Gymnasium	1.1
Healthcare-Clinic	1.0
Hospital	1.2
Hotel	1.0
Library	1.3
Manufacturing Facility	1.3
Motel	1.0
Motion Picture Theater	1.2
Multi-Family	0.7
Museum	1.1
Office	1.0
Parking Garage	0.3
Penitentiary	1.0
Performing Arts Theater	1.6
Police/Fire Station	1.0
Post Office	1.1
Religious Building	1.3
Retail ^b	1.5
School/University	1.2
Sports Arena	1.1
Town Hall	1.1
Transportation	1.0
Warehouse	0.8
Workshop	1.4

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

- In cases where both a general building area type and a more specific building area type are listed, the more specific building area type shall apply.
- Where lighting equipment is specified to be installed to highlight specific merchandise in addition to lighting equipment specified for general lighting and is switched or dimmed on circuits different from the circuits for general lighting, the smaller of the actual wattage of the lighting equipment installed specifically for merchandise, or 1.6 W/ft² times the area of the specific display but not to exceed 50% of the floor area, or 3.9 W/ft² times the actual case or shelf area for displaying and selling jewelry, china or silver, shall be added to the interior lighting power determined in accordance with this line item.

505.2.4 Exterior Lighting Controls

Topic	2006 IECC	2009 IECC
Exterior Lighting Controls	<p>505.2.4 Restricts the type of controls that can be used to control exterior lighting not intended for 24 hour operation. This includes:</p> <ul style="list-style-type: none"> •Not designated for dusk-to-dawn operation – astronomical time switch •Lighting designated for dawn-to-dusk operation – astronomical time switch or photosensor. •Astronomical time switches are required to have 10 hour battery back-up. •Exempts lighting for covered vehicle entrances or exits from buildings, or parking structures where required by safety, security or eye adaptation. 	<p><i>Not designed for Dusk to Dawn</i> Either photosensor and time switch or Astronomical time switch</p> <p>Dust to Dawn Design Astronomical time switch or photo sensor</p>

505.6 Exterior Lighting Adjustment

Adopts a Four Zone Lighting Power Density for Exterior Lighting Requirements

Topic	2006 IECC	2009 IECC
Exterior Lighting	Section 505.6 Requires all exterior lighting greater than 100 watts to have a minimum efficacy of 60 lumens per watt unless that lighting is controlled by a motion sensor or is exempted. Requires lighting budgets for all exterior lighting. Includes categories for “Tradable Surfaces” and “Nontradable” Surfaces. Limits the total wattage that can be installed on the exterior of commercial buildings.	Creates exterior lighting zones for exterior lighting based on lighting need. Exterior lighting allowances are defined by the following lighting zones with the highest lighting levels allowed in Zone 4: Zone 1: Developed areas of National Parks, State Parks, Forest Land, and Rural areas Zone 2: Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use and residential mixed use areas Zone 3: All other areas Zone 4: High activity commercial districts in major metropolitan areas as designated by the local land use planning authority. A base lighting allowance is allowed for each lighting zone - from 500 watts to 1,300 watts – for Zones 1 to 4 respectively.

Table 505.6.2(2)

**TABLE 505.6.2(2)
INDIVIDUAL LIGHTING POWER ALLOWANCES DENSITIES FOR BUILDING EXTERIORS**

		<u>Zone 1</u>	<u>Zone 2</u>	<u>Zone 3</u>	<u>Zone 4</u>
Base Site Allowance (base allowance may be used in tradable or non-tradable surfaces)		<u>500 W</u>	<u>600 W</u>	<u>750 W</u>	<u>1300 W</u>
Applications	Lighting Power Densities				
Tradable Surfaces (Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas may be traded.)	Uncovered Parking Areas				
	Parking Lots areas and drives	<u>0.04 W/ft²</u>	<u>0.06 W/ft²</u>	<u>0.10 W/ft²</u>	<u>0.16-0.13 W/ft²</u>
	Building Grounds				
	Walkways less than 10 feet wide	<u>0.7 W/linear foot</u>	<u>0.7 W/linear foot</u>	<u>0.8 W/linear foot</u>	<u>1.0 W/linear foot</u>
	Walkways 10 feet wide or greater Plaza areas Special Feature Areas	<u>0.14 W/ft²</u>	<u>0.14 W/ft²</u>	<u>0.18 W/ft²</u>	<u>0.2 W/ft²</u>
	Stairways	<u>0.75 W/ft²</u>	<u>1.0 W/ft²</u>	<u>1.0 W/ft²</u>	<u>1.0 W/ft²</u>
	Pedestrian Tunnels	<u>0.15 W/ft²</u>	<u>0.15 W/ft²</u>	<u>0.2 W/ft²</u>	<u>0.3 W/ft²</u>
	Building Entrances and Exits				
	Main entries	<u>20 W/linear foot of door width</u>	<u>20 W/linear foot of door width</u>	<u>30 W/linear foot of door width</u>	<u>30 W/linear foot of door width</u>
	Other doors	<u>20 W/linear foot of door width</u>	<u>20 W/linear foot of door width</u>	<u>20 W/linear foot of door width</u>	<u>20 W/linear foot of door width</u>
	Entry Canopies	<u>0.25 W/ft²</u>	<u>0.25 W/ft²</u>	<u>0.4 W/ft²</u>	<u>0.36-0.4 W/ft²</u>
	Sales Canopies and Overhangs				
	Canopies (free standing and attached and overhangs)	<u>0.6 W/ft²</u>	<u>0.6 W/ft²</u>	<u>0.6 W/ft²</u>	<u>0.36-1.0 W/ft²</u>
	Outdoor Sales				
	Open areas (including vehicle sales lots)	<u>0.25 W/ft²</u>	<u>0.25 W/ft²</u>	<u>0.5 W/ft²</u>	<u>0.6-0.7 W/ft²</u>
Street frontage for vehicle					