



2018 IECC Commercial Electrical Power and Lighting Systems

Why Care About IECC?

- Energy codes and standards set minimum efficiency requirements for new and renovated buildings, assuring reductions in energy use and emissions over the life of the building. Energy codes are a subset of building codes, which establish baseline requirements and govern building construction.
- Code buildings are more comfortable and cost-effective to operate, assuring energy, economic and environmental benefits.

Commercial Compliance Options

1

- ASHRAE 90.1-2016

OR

2

2018 IECC - Prescriptive

- C402 - Envelope
 - C403 - Mechanical
 - C404 - SWH
 - C405 - Lighting
- AND
- Pick At Least One C406:

C406.2 – Eff. HVAC Performance

C406.3 – Reduced Lighting Power

C406.4 – Enhanced Lighting Controls

C406.5 – On-site Supply of Renewable energy

C406.6 – Dedicated Outdoor Air System

C406.7 – High Eff. Service Water Heating

C406.8 – Enhanced Envelope Performance

C406.9 – Reduced Air Infiltration

OR

3

2018 IECC - Performance

- C407 – Total Building Performance
- C402.5 – Air Leakage
- C403.2 – Provisions applicable to all mechanical systems
- C404 - SWH
- Lighting Mandatory Sections
 - C405.2
 - C405.3
 - C405.4
 - C405.6
- Building energy cost to be $\leq 85\%$ of standard reference design building

When do the Lighting and Power Requirements Apply?

- ✓ Original Installed Lighting System in a New Building, Addition, or Tenant Build-out
- ✓ Existing Lighting System that is Altered
- ✓ Change in Occupancy that Increases Energy
- ✓ Change in Occupancy that requires less LPD as shown in the LPD tables

Exceptions:

- Historic buildings
 - State or National listing
 - Eligible to be listed
- Alterations where less than 10% of the luminaires in a space are replaced and installed interior power lighting is not increased
- Lighting within dwelling units
 - Where $\geq 75\%$ of permanently installed fixtures (except low-voltage) are fitted for and include high-efficacy lamps
- Walk-in coolers, walk-in freezers, refrigerated warehouse coolers, and refrigerated warehouse freezers comply with C403.2.15 or C403.2.16

What's Covered Under Electrical Power and Lighting Systems Requirements?

- Mandatory Interior Lighting requirements
 - Required Controls
 - Wattage/Efficiency Limits
- Interior Lighting Power Allowances (watts/ft²)
- Exterior Lighting Controls
 - Required Controls
 - Lamp Efficiency
- Exterior Lighting Power Allowances (watts/ft²)
- Dwelling Electric Meters
- Electrical Transformers and Motors
- Vertical and Horizontal Transportation Systems and Equipment



What's Covered Under Electrical Power and Lighting Systems Requirements?

Exception:

- Dwelling units within commercial buildings are not required to comply IF they comply with the residential Section R404.1

A minimum of 75 percent of the lamps in permanently installed lighting fixtures are high-efficacy lamps or 75% of permanently installed lighting fixtures contain only high efficacy lamps

Exception:

- ✓ Low-voltage lighting

- ✓ Compact fluorescent lamps, **LED lamps**, T8 or smaller diameter linear fluorescent lamps, or **other** lamps with an efficacy based on lamp wattage

Lamp Wattage	Efficacy
> 40 watts	60 lumens/watt
15-40 watts	50 lumens/watt
< 15 watts	40 lumens/watt

Additional Efficiency Package Options

Section C406

One or more additional efficiency features must be selected to comply with the IECC

- More efficient HVAC performance, OR
- Reduced lighting power system, OR
- Enhanced lighting controls, OR
- On-site supply of renewable energy, OR
- Dedicated outdoor air system, OR
- More efficient SWH, OR
- **Enhanced envelope performance, OR**
- **Reduced air infiltration**



High Efficiency HVAC



More Efficient Lighting System



Onsite Renewables

Two methods to determine allowance:

✓ Building Area Method

- Floor area for each building area type x value for the area
- “area” defined as all contiguous spaces that accommodate or are associated with a single building area type as per the table
- When used for an entire building, each building area type to be treated as a separate area

✓ Space-by-Space Method

- Floor area of each space x value for the area
- Then sum the allowances for all the spaces
- Tradeoffs among spaces are allowed

Building Area Method

Table C405.3.2(1)

Building Area Type	LPD (w/ft ²)
Automotive facility	0.71
Convention center	0.76
Courthouse	0.90
Dining: bar lounge/leisure	0.90
Dining: cafeteria/fast food	0.79
Dining: family	0.78
Dormitory	0.61
Exercise center	0.65
Fire station	0.53
Gymnasium	0.68

(partial table)

Space-By-Space Method

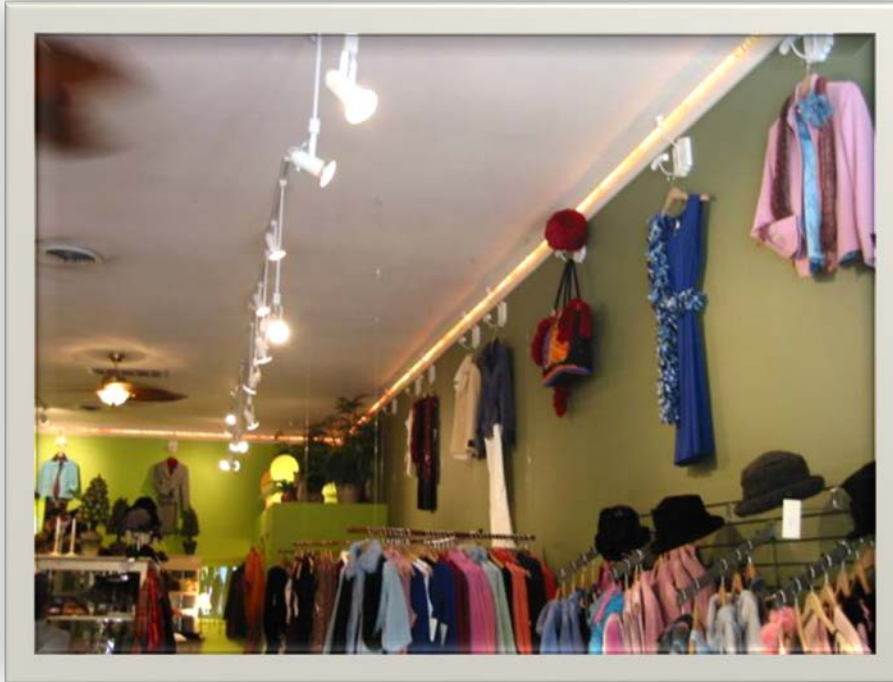
Table C405.3.2(2)

Common Space Types	LPD (w/ft ²)
Locker room	0.48
Lounge/breakroom	
In a healthcare facility	0.78
Otherwise	0.62
Office	
Enclosed	0.93
Open plan	0.81
Parking area, interior	0.14
Pharmacy area	1.34

(partial table)

Additional Interior Lighting Power

Section C405.3.2.2.1



Additional Interior Lighting Power Allowance =

1000 watts +

(Retail Area 1 x **0.45** W/ft²) +

(Retail Area 2 x **0.45** W/ft²) +

(Retail Area 3 x **1.05** W/ft²) +

(Retail Area 4 x **1.87** W/ft²),

Where:

- ✓ **Retail Area 1** = the floor area for all products not listed in Retail Area 2, 3 or 4.
- ✓ **Retail Area 2** = the floor area used for the sale of vehicles, sporting goods and small electronics.
- ✓ **Retail Area 3** = the floor area used for the sale of furniture, clothing, cosmetics and artwork.
- ✓ **Retail Area 4** = the floor area used for the sale of jewelry, crystal, and china.

Additional Interior Lighting Power

Section C405.3.2.2.1



Photo courtesy of Ken Baker, K energy

Exception:

- Other merchandise categories are permitted to be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is approved by the code official
- For spaces which lighting is specified to be installed in addition to general lighting or purpose of decorative appearance or for highlighting art or exhibits, provided that the add'l lighting power is **< 0.9 W/ft² in lobbies and < 0.75 W/ft² in other spaces**

Proposed Connected Lighting Calculation

Section C405.3.1

Proposed lighting wattage must be calculated in accordance with *Equation 4-10*

- **$TCLP = [LVL + BLL + LED + TRK + OTHER]$**

- TCLP = total connected lighting power (watts)
- LVL = labeled wattage of luminaires connected directly to building power
- BLL = wattage of the ballast or transformer
- LED = wattage of LEDs with either integral or remote drivers
- TRK = wattage of lighting tracks, cable conductors, rail conductors, and plug-in busways specified wattage of the luminaires but not less than 8 W per linear foot OR the wattage limit of other permanent current-limiting devices on the system OR wattage limit of the transformer
- OTHER = the wattage of all other luminaires and lighting sources not covered previously and associated with interior lighting verified by data supplied by the manufacturer or other approved sources

Exemptions to Proposed Interior Lighting Power Calculation

Section C405.3.1

- ✓ Television broadcast lighting for playing areas in sports arenas
- ✓ Emergency lighting automatically off during normal business operation
- ✓ Lighting for occupants with special needs (visual impairment and other medical and age-related issues)
- ✓ Casino gaming areas
- ✓ Mirror lighting in dressing rooms
- ✓ Task lighting for medical and dental purposes (in addition to general lighting and controlled independently)
- ✓ Display lighting for exhibits in galleries, museums and monuments (in addition to general lighting and controlled independently)
- ✓ Theatrical, stage, film, and video production
- ✓ Used for photographic processes
- ✓ Integral to equipment or instrumentation installed by manufacturer
- ✓ Plant growth or maintenance
- ✓ Advertising or directional signage
- ✓ Food warming
- ✓ Lighting equipment that is for sale
- ✓ Lighting demonstration equipment in lighting education facilities
- ✓ Approved because of safety considerations
- ✓ In retail display windows when the display is enclosed by ceiling-height partitions
- ✓ Furniture-mounted supplemental task lighting controlled by automatic shutoff
- ✓ Exit signs

- Sum the wattage of all proposed connected lighting power

This must include all lighting that is part of the design for the space including:

- ✓ Overhead lighting
 - ✓ Task lighting
 - ✓ Decorative lighting
- Compare values; proposed wattage must be less than or equal to allowed wattage

Lighting systems required to be provided with controls as specified for:

- Occupant sensor controls – C405.2.1
- Time-switch controls – C405.2.2
- Daylight-responsive controls – C405.2.3
- Specific application controls – C405.2.4
- **Manual controls – C405.2.5**
- **Exterior lighting controls – C405.2.6**



Occupant Sensor Controls

Sections C405.2.1, C405.2.1.1

Occupancy sensors are required in:

- ✓ Classrooms/lecture/training rooms
- ✓ Conference/meeting/multipurpose rooms
- ✓ Copy/print rooms
- ✓ Lounges/**breakrooms**
- ✓ **Enclosed offices**
- ✓ **Open plan office areas**
- ✓ Restrooms
- ✓ Storage rooms
- ✓ Locker rooms
- ✓ Other spaces < 300 ft² enclosed by floor-to-ceiling height partitions
- ✓ Warehouse **storage areas**

Occupancy sensor function (other than for warehouses):

- ✓ Automatically turn lights off within **20** minutes **after** occupants **have left** space
- ✓ Either manual-on or controlled to automatically turn on lighting to not more than 50% power
- ✓ Incorporate a manual control to allow occupants to turn off lights

Exemptions:

Full auto-on controls allowed in

- ✓ Public corridors
- ✓ Stairways
- ✓ Restrooms
- ✓ Primary building entrance areas and lobbies
- ✓ Areas where manual-on operation would endanger safety or security of room or occupants

Occupant Sensor Controls

Section C405.2.1.2 - Warehouses

- Aisleways and open areas
 - Automatically reduce lighting power by $\geq 50\%$ when areas are unoccupied
 - Control lighting in each aisleway independently
 - Not control lighting beyond the aisleway being controlled by the sensor

- Spaces less than 300 ft² to comply with C405.2.1.1
- All other spaces to comply with:
 - General lighting controlled separately in zones with floor areas not greater than 600 ft²
 - Automatically turn off general lighting in all control zones within 20 minutes after occupants have left
 - General lighting power in each control zone reduced by not less than 80% of full zone general lighting power, in reasonable uniform illumination pattern within 20 minutes of all occupants leaving
 - Control functions that switch control zone lights completely off when zone is vacant meet this requirement
 - Any daylight responsive control to active general lighting or control zone general lighting only when occupancy for the same area is detected

Each area of the building that is NOT provided with occupant sensor control must have a time-switch control to turn lights off automatically.

Exceptions where a manual control can provide the light reduction and **time-switch control is not required:**

- Spaces where patient care is directly provided
- Spaces where an automatic shutoff would endanger occupant safety or security
- Lighting intended for continuous operation
- Shop and laboratory classrooms

Must include an override switching device with the following:

- Minimum 7-day clock
- Capable of being set for 7 different day types/week
- Incorporate holiday “shutoff” feature to turn all controlled lighting loads for ≥ 24 hours and resume to normally scheduled operations
- Program backup capabilities to prevent loss of program and time setting for ≥ 10 hours if power is interrupted
- Override switch should include:
 - Manual control
 - Control lighting to remain on for ≤ 2 hours
 - Control lighting for an area $\leq 5,000$ ft²

Exceptions:

- Mall **concourses**
- Auditoriums
- **Sales areas**
- **Manufacturing** facilities
- **Sports** arenas

- Time limit permitted to be > 2 hours provided switch is a captive key device
- Override switch **not limited to an area 5,000 ft² provided area is < 20,000 ft²**
- If area has a manual control:
 - spaces with 1 luminaire with rated power < 100 watts
- spaces that use < 0.6 watts/ft²
 - corridors, lobbies, electrical **rooms and** or mechanical rooms

Light-reduction Controls

Section C405.2.2.2



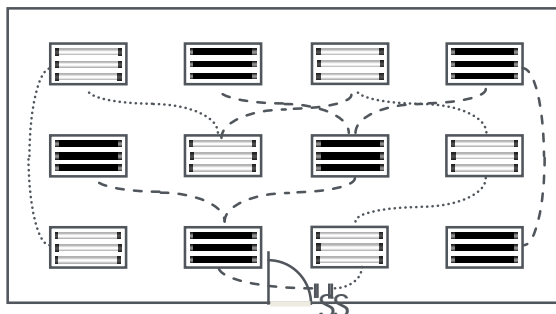
Light Reduction Controls must allow the occupant to reduce connected lighting load

- ✓ By **not less than** 50%
- ✓ In a reasonably uniform illumination pattern

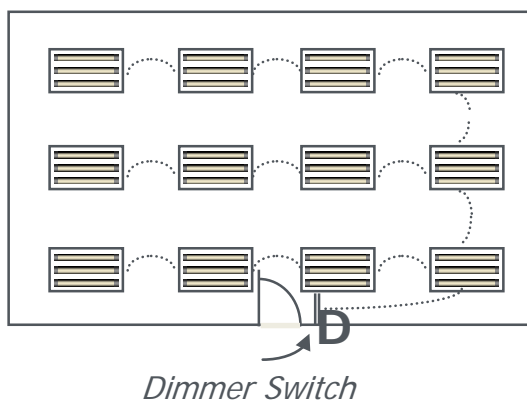
Light-reduction Control Options

- ✓ Controlling all lamps or luminaires
- ✓ Dual switching of alternate rows of luminaires, alternate luminaires or lamps
- ✓ Switching middle lamp luminaires independently from the outer lamps
- ✓ Switching each luminaire or each lamp

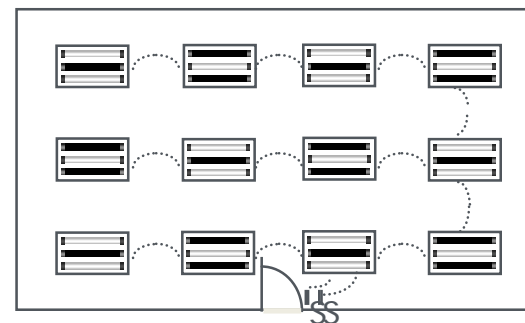
Alternating Luminaires



Dimming



Alternating Lamps



Light-reduction Controls

Section C405.2.2.2 - Exemption



Light Reduction Control **Not** required in daylight zones with daylight responsive controls complying with C405.2.3

Daylight-responsive Controls

Section C405.2.3

- Definition: A device or system that provides automatic control of electric light levels based on the amount of daylight in a space
- Required to control lighting in spaces with ≤ 150 watts of general lighting:
 - Sidelit zones
 - Toplit zones
- **Exceptions:**
 - Health care facilities where patient care is directly provided
 - Lighting required for specific application control per C405.2.4
 - Sidelight daylight zones on 1st floor above grade in Group A-2 and Group M occupancies

- **Toplit** zones shall be controlled independently of lights in **sidelit** zones
- Controls shall be configured so that they can be calibrated from within the space by authorized personnel
- Calibration mechanisms shall be **in a location with ready access**
- In offices, classrooms, laboratories, and library reading rooms, controls shall dim lights continuously from full light output to $\leq 15\%$

- **Configured to completely** shut off all controlled lights
- **Sidelit** zones facing different cardinal orientations (within 45 degrees of due north, east, south, west) controlled independently of each other

Exception:

- < 150 watts in each space is permitted to be controlled together with lighting in a daylight zone facing a different cardinal orientation

Definition: floor area adjacent to vertical fenestration ~~which~~ **that** complies with all of the following:

- Fenestration located in a wall:
 - **Sidelit** zone shall extend laterally to the nearest full-height wall
OR
 - $< 1.0 \times$ height from the floor to the top of the fenestration, and longitudinally from the edge of the fenestration to the nearest full-height wall, or up to 2 ft., whichever is less

- Area of fenestration $\geq 24 \text{ ft}^2$
- Distance from fenestration to any building or geological information **that** would block access to daylight is $>$ than the height from bottom of fenestration to top of building or geologic information
- The visible transmittance of fenestration ≥ 0.20

Definition: the floor area underneath a roof fenestration assembly **that** complies with all of the following:

- Zone shall extend laterally and longitudinally beyond the edge of the roof fenestration assembly to the nearest obstruction that is (taller) $> 0.7 \times$ the ceiling height, $> 0.7 \times$ the ceiling height, whichever is less
- Where located in rooftop monitor, toplit zone to extend laterally to nearest obstruction taller than $0.7 \times$ the ceiling height, or up to 1.0 times the height from floor to bottom of fenestration, whichever is less, and longitudinally from the edge of the fenestration to the nearest obstruction taller than $0.7 \times$ ceiling height, or up to 0.25 times the height from the floor to bottom of fenestration, whichever is less
- No building or geological formation blocks direct sunlight from hitting the roof fenestration assembly at the peak solar angle on the summer solstice
- Where located in existing buildings, visible transmittance of the roof fenestration assembly times the area of the rough opening of the roof fenestration assembly divided by area of daylight zone ≥ 0.008

Specific Application Controls

Section C405.2.4

- ✓ These types to be controlled by **occupant sensor or time-switch control, and a manual control provided to control separately from general lighting**
 - Display and accent lighting
 - Display case lighting
 - Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting
 - Equipment for sale or educational demonstrations
- ✓ Hotel and motel sleeping units
 - Master control device capable of automatically switching off all installed luminaires and switched receptacles within 20 minutes of occupants leaving the room
 - **Exceptions:** lighting and switch receptacles controlled by captive key systems **and spaces where patient care is provided**
- ✓ Permanently installed luminaires within dwelling units to have controls complying with C405.2.1.1 or C405.2.2.2
- ✓ Nonvisual applications, plant growth and food warming shall be controlled via time-switch control

- ✓ In a location where
 - occupants have ready access
 - controlled lights are visible (or identify the area served by the lights and indicate status)

Total exterior connected lighting power to be the maximum rated wattage of all lighting powered through the energy service to the building

Exception: approved because of safety considerations

Connected Exterior Lighting Power must not exceed Exterior Lighting Power Allowance except where approved because of historical, safety, signage or emergency considerations:

1. Calculate exterior lighting power allowance
 - Lighting power densities by exterior function and by applicable lighting zone
2. Calculate proposed connected lighting power
 - Wattage calculation “rules”
 - Exempted lighting
3. Compare values: proposed wattage must be less than or equal to allowed wattage

Exemptions from Exterior Calculation

Section C405.4.1

The following lighting does not need to be included in the proposed lighting calculation:

- Emergency lighting automatically off during normal business operation
- Exit signs
- Specialized signal, directional, and marker lighting associated with transportation
- Advertising signage or directional signage
- Lighting integral to *equipment* or instrumentation and installed by its *manufacturer*
- Lighting for theatrical purposes, including performance, stage, film production, and video production
- Lighting for athletic playing areas
- Temporary lighting
- Lighting for industrial production, material handling, transportation sites, and associated storage areas
- Theme elements in theme/amusement parks
- Lighting used to highlight features of art, public monuments, and the national flag
- Lighting used for water features and swimming pools
- Lighting controlled from within dwelling units and complying with R404.1

Exterior Lighting Zones

Table C405.4.2(1)

Power allowances are listed by lighting zone

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

Exterior Lighting Zones

Table C405.4.2(1)



Exterior Lighting Zones

Table C405.4.2(2)

Allowances include a base allowance plus tradeable allowance

		<u>Zone 1</u>	<u>Zone 2</u>	<u>Zone 3</u>	<u>Zone 4</u>
Base Site Allowance		350 W	400 W	500 W	900 W
	Uncovered Parking Areas				
	Parking areas and drives	0.03 W/ft ²	0.04 W/ft ²	0.06 W/ft ²	0.08 W/ft ²
	Building Grounds				
	Walkways and ramps less than 10 feet wide	0.5 W/linear foot	0.5 W/linear foot	0.6 W/linear foot	0.7 W/linear foot
	Walkways and ramps 10 feet wide or greater Plaza areas Special Feature Areas	0.10 W/ft ²	0.10 W/ft ²	0.11 W/ft ²	0.14 W/ft ²

Partial Table

Exterior Lighting Zones cont'd.

		<u>Zone 1</u>	<u>Zone 2</u>	<u>Zone 3</u>	<u>Zone 4</u>
	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	135 W per location plus 45 W per additional ATM per location			
	Uncovered entrances and gatehouse inspection stations at guarded facilities	0.5 W/ft ² of area			
	Uncovered loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.35 W/ft ² of area			
	Drive-up window and doors	200 W per drive-through			
	Parking near 24-hour retail entrances	400 W per main entry			

Exterior Lighting Control Requirements

Section C405.2.6

- ✓ Exterior lighting systems provided with controls complying with C405.2.6.1 through C405.2.6.4
- ✓ Decorative lighting systems comply with Sections C405.2.6.1, C405.2.6.2, and C405.2.6.4

Exceptions: Covered vehicle entrances or exits from buildings and parking structures where required for safety, security or eye adaptation; **and lighting controlled from within dwelling units**



- ✓ Lighting to be automatically off if sufficient daylight is present satisfying needs in the space

Decorative Lighting Shutoff

Section C405.2.6.2

- ✓ Lighting for building façade and landscape automatically off from **not later than** 1 hour after business closing to **not earlier than** 1 hour before opening

Lighting Setback

Section C405.2.6.3

- ✓ Building façade or landscape NOT covered in Section C405.2.6.2 shall have controls configured to automatically reduce connected lighting power $\geq 30\%$
 - ✓ no later than midnight to **not earlier than** 6 am
 - ✓ from **not later than** 1 hour after business closing to **not earlier than** 1 hour before opening
 - ✓ any period where activity has not been detected for at least 15 minutes

Exterior Time-Switch Control Function

Section C405.2.6.4

- ✓ All time switch controls
 - ✓ have a clock capable of being programmed for not fewer than 7 days
 - ✓ capable of being set for 7 different day types per week
 - ✓ incorporate automatic holiday setback feature
 - ✓ be able to retain programming and the time setting during loss of power for a period of ≥ 10 hours

Dwelling Electrical Meter

Section C405.5 - Mandatory

Separate metering required for each dwelling unit



- **Low-voltage dry-type distribution** electric transformers must meet minimum efficiency requirements of Table C405.6 when tested and rated in accordance with test procedure 10 CFR 431
- Efficiency to be verified through certification under an approved certification program or when program does not exist, ratings shall be supported by data furnished by transformer manufacturer

Exceptions:

- If meet EAct 2005 exclusions based on 10 CFR 431
 - Special purpose applications
 - Not likely in general purpose applications
 - Have multiple voltage taps where highest tap is $\geq 20\%$ more than lowest tap
- Some specific products are listed

- Electric motors must meet minimum efficiency requirements of Tables C405.7(1) through C405.7(4) when tested and rated in accordance with test procedure 10 CFR 431
- Efficiency to be verified through certification under an approved certification program or when program does not exist, ratings shall be supported by data furnished by motor manufacturer

Vertical and Horizontal Transportation System and Equipment

Section C405.8.1 – Elevator Cabs

- The sum of lumens divided by the sum of the watts ≥ 35 lumens/W (not including signal and displays)
- Ventilation fans without their own air-conditioning system shall not consume ≤ 0.33 watts/cfm at the max. rated speed of the fan
- Controls shall be provided that will de-energize ventilation fans and lighting systems when the elevator is stopped, unoccupied and with its doors closed for > 15 minutes

Section C405.8.2 – Escalators and Moving Walks

- Must comply with ASME A17.1/CSA B44
- Automatic controls configured to reduce speed to minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers

Exception: variable voltage drive systems that reduce operating voltage in response to light loading conditions is an alternative to reduced speed function

- Regenerative drive
 - Escalators designed for one-way down operation only or for reversible operation
 - Must have a variable frequency regenerative drive that supplies electrical energy to the building electrical system when escalator is loaded with passengers with a combined weight > 750 pounds

Functional Testing of Lighting Controls

Section C408.3.1

- ✓ Prior to passing final inspection, *registered design professional* to provide evidence that lighting control systems have been tested to ensure that control hardware and software are calibrated, adjusted, programmed and in proper working order per construction documents and manufacturer's installation instructions

- Certify location and aiming per manufacturer recommendation
- Test all sensors if project ≤ 7
- If > 7 sensors, test for each unique combination of sensor type and space geometry
- Where multiples of each unique combination of sensor type and space geometry are provided $\geq 10\%$, but in no case < 1 of each combination shall be tested unless the code official or design professional requires a higher percentage to be tested
- Where $\geq 30\%$ of tested controls fail, all remaining identical combinations must be tested

Verify the following:

- Status indicator, verify correct operation
- Lights turn off or down to permitted level within required time
- Auto-on – lights turn on to permitted level when someone enters the space
- Manual on – lights turn on only when manually activated
- Lights aren't incorrectly turned on by movement in nearby areas or by HVAC operation

- Confirm programmed schedules
- Document schedules for owner
- Verify correct time and date are set
- Verify any battery backup is installed and energized
- Verify override time limit set to ≤ 2 hours
- Simulate occupied condition and verify and document:
 - Lights turn on and off with respective switches
 - Switch only operates lights in enclosed space where switch is located
- Simulate unoccupied condition and verify and document:
 - All nonexempt lights turn off
 - Manual override only operates lighting where it is located
- Additional testing as specified by the *registered design professional*

- For daylight responsive controls
 - Properly located, field-calibrated, and set to have appropriate setpoints and threshold light levels
 - Daylight controlled lighting loads adjust to correct levels with available daylight
 - Authorized personnel have ready access to calibration adjustment equipment

Documentation Requirements

Section C408.3.2

- Construction documents specify that documents in this section be provided to building owner or **owner's authorized agent** within 90 days of date of receipt of *certificate of occupancy*



New lighting systems installed as part of an addition to comply with C405

- Total interior lighting power to comply C405.3.2
 - Stand alone addition
 - Addition + existing building as a single building
- Total exterior lighting power to comply C405.4.2
 - Stand alone addition
 - Addition + existing building as a single building
- Repairs – C504.2
 - Repairs exempt where only the bulb, ballast or both within the existing luminaires in a space are replaced, provided that the replacement does not increase the installed interior lighting power