CECD1-5-22

IECC: C405.2.9, C405.2.9.1 (New), C406.3.2, C408.3.1.6 (New)

Proponents: Michael Jouaneh, representing IECC CE Electrical Power, Lighting, and Renewables Subcommittee (ieccceelectrical@iccsafe.org)

2024 International Energy Conservation Code [RE Project]

Revise as follows:

C405.2.9 Demand responsive lighting controls. ~~*Buildings* shall have controls that are capable of automatically reducing general lighting power not less than 15 percent in response to a demand response signal.~~ Interior *general lighting* in group B, E, M, and S occupancies shall have *demand responsive controls* complying with C405.2.9.1 in not less than 75 percent of the interior floor area.

Exceptions:

1. ~~Buildings with less than 4,000 watts of combined installed general lighting power in spaces that have more than 0.5 W/ft^2 (5.38 W/m^2) of general lighting power.~~ Where the combined interior floor area of group B, E, M, and S occupancies is less than 10,000 square feet.
2. ~~*Buildings* where demand response programs are not available.~~ *Buildings* where a *demand response signal* is not available from a controlling entity other than the owner.
3. ~~I-2 and I-3 occupancies.~~ Parking garages.

Add new text as follows:

C405.2.9.1 Demand responsive lighting controls function. Demand responsive lighting controls shall be capable of the following:

1. Automatically reducing the output of demand responsive controlled lighting to 80 percent or less of full power or light output upon receipt of a *demand response signal*.
2. Where high end trim has been set, automatically reducing the output of controlled lighting to 80 percent or less of the high-end trim set point upon receipt of a *demand response signal*.
3. Dimming controlled lights gradually and continuously over a period of not longer than 15 minutes to get to their demand response setpoint.
4. Returning lights to their normal operational settings at the end of the demand response event.

Exception: Warehouse and retail storage building areas shall be permitted to switch off 25 percent or more of *general lighting* power rather than dimming.

Revise as follows:

C406.3.2 G01 Lighting Load Management. ~~Luminaires shall have dimming capability and automatic load management controls that shall gradually reduce *general lighting* power during peak periods. The load management controls shall reduce lighting power in 75 percent of the building area by at least 20 percent with *continuous dimming* over a period no longer than 15 minutes. Where less than 75 percent, but at least 50 percent of the project *general lighting* is controlled, the credits from Tables C406.3 shall be prorated as follows:~~ A project not required to comply with C405.2.9 can achieve energy credits for installing demand responsive lighting controls for interior *general lighting* that comply with C405.2.9.1. The demand responsive lighting controls shall automatically reduce the light output or power of controlled lighting to no more than 80 percent of full output, or 80 percent of the high-end trim set point, whichever is less. Energy credits can be earned where demand responsive lighting controls are installed for the following:

1. Not less than 10 percent of the interior floor area in Group R or I occupancies; or
2. Not less than 50 percent of the interior floor area in all other occupancies.

G01 credits shall be prorated using Equation 4-29 with no more than 75 percent of the interior floor area being counted.

(Equation 4-29)

[~~building~~ interior floor area with lighting load management, %] x [table credits for C406.3.2] / 75%

~~**Exception:** Warehouse or retail storage building areas shall be permitted to achieve this credit by switching off at least 25 percent of lighting power in 75 percent of the building area without dimming, or as adjusted by Equation 4-29.~~

Add new text as follows:

C408.3.1.6 Demand responsive lighting controls G01.. For spaces associated with the project receiving Renewable and Load Management Credits in Section C406.3.2, the following procedures shall be performed:

1. Confirm the maximum set point upon receipt of the *demand response signal* has been established for each space.

2. For projects with seven or fewer rooms with controls, each room shall be tested.

3. For projects with more than seven rooms with controls, testing shall be done for each unique space type. Where multiple rooms of each space type exist, not less than 10 percent and in no case fewer than one room, of each space type shall be tested unless the *code official* requires a higher percentage to be tested. Where 30 percent or more of the tested controls fail in a space type, all remaining identical space types shall be tested.

4. For demand responsive controls to be tested, verify the following:

   4.1 Where *high-end trim* controls are used, the high-end trim shall be set before testing.

   4.2 Turn off all non-general lighting in the room.

   4.3 Set general lighting to its maximum illumination level. Where *high-end trim* is set, this will be the maximum illumination level at the high-end trim setpoint.

   4.4 An illumination measurement shall be taken in an area of the room not controlled by daylight responsive controlled lighting. If there is not an area without *daylight responsive controls* the *daylight responsive controls* shall be overridden from reducing the lighting level during the test.

   4.5 Measure and document the room maximum illumination level.

5. Simulate a *demand response signal* and measure the illumination level at the same location as for the measurement in C408.3.1.5.(4.5). Verify the illumination level has been reduced to no greater than 80 percent of the maximum illumination level documented in C408.3.1.5.(4.5).

6. Simulate the end of a demand event by turning off the *demand response signal*, confirm controls automatically return to their normal operational settings at the end of the demand response event.

Reason: This proposal makes a number of important improvements to the code requirements for demand responsive lighting controls:
1. It limits the scope in base code to those occupancies (B, E, M, and S) where this can reasonably be achieved without excessive complexity and/or negative impact on building operations.
2. Changes the 4,000W exception to 10,000 square feet to significantly simplify compliance determination.
3. Specifies the capabilities of the required controls, so that it is clear to designers and building code officials what control systems would comply.
4. Modifies C406.3.2 to refer to the technical requirements in C405.2.9.1 so that the code can have one clear and consistent standard for how these controls operate.
5. Revises language to be clear that compliance with both base code and energy credits is determined occupancy by occupancy for mixed-use buildings.
6. Adds functional testing requirements for demand responsive lighting controls.
To coordinate with C405.2.9 requirements, where a demand response signal is available and the building is not exempt, the credits are reduced by half.

Cost Impact: The code change proposal will decrease the cost of construction.
This code change proposal will decrease the cost of construction by limiting the requirement for demand responsive lighting controls in C405.2.9 to occupancy groups B, E, M, and S.