

## Suggested energy code solutions for commercial buildings

The compliant solutions listed below are suggested based on total installed cost, simplicity of design, and basic functional needs for the space. These solutions represent one of multiple options to meet or exceed lighting and receptacle control requirements.<sup>1</sup> ASHRAE 90.1 2016 can also be used as a compliance option in meeting IECC 2018 requirements. Applications in this guide will illustrate these solutions and/or alternate solutions for advanced functionality.

Diagram key:

= New construction and retrofit<sup>2</sup>

		Atrium	Classroom, Lecture Hall, Training Room	Conference, Break Room	Corridor <sup>3</sup>	Guestroom <sup>4</sup>	Lobby	Open Office (>300 sq. ft.)	Parking Garage <sup>5</sup>	Private Office (<300 sq. ft.)	Restroom	Stairwell <sup>3</sup>	Storage Room	Facade/Landscape	Parking Lot/Other Exterior <sup>6</sup>	
Manual Control	Switch															
	Dimmer or scene control															
Automatic ON/OFF Control	Timeclock															
	Occupancy sensor															
	Settings	Full ON														
		Partial ON														
		Manual ON														
		Full OFF														
		Partial OFF							<sup>7</sup>				<sup>8</sup>			
Daylight responsive control <sup>9</sup>							<sup>8</sup>		<sup>8</sup>							
Receptacle control																
Demand response																

1 Projects that use Luminaire Level Lighting Controls (dimmable luminaires with wireless zoning and embedded occupancy and daylight sensors) for all the lighting provides an alternate compliance path for the mandatory lighting control requirements.

2 All retrofits altering more than 10% of the luminaires, or retrofits that increase the installed lighting power, must comply with all new construction requirements.

3 To comply with some life safety code requirements for egress illumination, automatic full OFF is not suggested. For non-egress areas, the occupancy sensor should turn the lights to full OFF and a switching control may be used.

4 Automatic shutoff is required for all installed luminaires and switched receptacles.

5 Timeclock ensures the lights are OFF during non-operating hours. Occupancy sensor turns lights down in unoccupied zones.

6 Astronomical timeclock shall ensure all lights are off during daylight hours. Lights should be scheduled to Partial OFF during night hours. See section C405.2.7.3 for scheduling times.

7 Control zones are limited to 600 sq. ft. or less. Once a zone is vacant for 20 minutes, the occupancy sensor automatically reduces lighting in the zone by 80% of full light output or turns lighting OFF in the vacant zone.

8 Not a code requirement. Lutron recommends this solution for spaces designated as a path of egress.

9 Continuous daylight dimming down to at least 15% of full output, plus an OFF step, is required in qualifying daylight zones.

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# IECC 2021: Application Summary

## Code requirement summary

	Minimum control type	Description	Code provision	
<b>Manual Control<sup>1</sup></b>	Switch	Lighting shall be capable of turning ON and OFF. There shall be at least one manual device for control of the lighting within a space. See code for spaces that allow remote location of control.	C405.2.6	
	Dimmer or scene control	Lighting shall be capable of being reduced by at least 50% of maximum lighting power. There shall be at least one manual control device for light reduction within a space. See code for spaces that allow remote location of control. Automatic daylight control may be used instead of manual control.	C405.2.2.3	
<b>Automatic ON/OFF Control<sup>1</sup></b>	Timeclock	<b>Interior:</b> Scheduled control, based on time-of-day, turns lighting ON or OFF based on operating schedule. Occupancy sensors also comply as an alternate to using a timeclock. <b>Exterior:</b> Scheduled control, based on time-of-day and sunrise/sunset (requires astronomical timeclock), turns lighting ON or OFF based on typical occupancy and daylight.	C405.2.2 C405.2.7	
	Occupancy sensor	Automatic control turns lighting ON upon occupancy or OFF after a vacancy of 20 minutes or less.	C405.2.1	
	Settings	Full ON	When initiated by a timeclock or occupancy sensor, lighting is automatically turned ON to maximum lighting power.	C405.2.1.1 Exception
		Partial ON	When initiated by a timeclock or occupancy sensor, lighting is automatically turned ON to 50% or less of maximum lighting power.	C405.2.1.1
		Manual ON	Lighting is turned ON manually by an occupant.	C405.2.1.1
		Full OFF	When initiated by a timeclock or occupancy sensor, lighting is automatically turned OFF.	C405.2.1
Partial OFF		In vacant corridors, warehouse aisles, open office zones, and parking garage zones, lighting is automatically reduced by at least 50% of maximum lighting power (80% for open office, 30% for parking garages). Automatic full OFF also complies.	C405.2.1.2, C405.2.1.3 C405.2.1.4 C405.2.8	
<b>Other<sup>1</sup></b>	Daylight responsive control	<b>Interior:</b> A sensor which adjusts lighting in response to available daylight is required for sidelight and skylight zones when the total lighting power in the daylight zones in a space is at least 150 W. Continuous daylight dimming down to at least 15% of full output plus OFF is required. See the "Daylight Zone Requirements" diagrams for more information. <b>Exterior:</b> A photosensor can be used as an alternate to the dawn/dusk operation of an astronomical timeclock.	C405.2.4 C405.2.7.1	
	Receptacle control	At least 50% of the receptacles in certain spaces shall automatically turn OFF based on operating schedule or after a vacancy of 20 minutes or less.	C405.11	
	Demand response	Demand response is not required by this energy code.	N/A	

For areas being used as a path of egress or fixtures being used for emergency, verify compliance with your local authority having jurisdiction. Acceptance (functional) testing is required for all new construction applications to ensure that control hardware and software are calibrated, programmed and functioning properly (Code provision C408.3).

Enhanced Digital Lighting Controls is one compliance path of the Additional Efficiency Package requirement (Section C406).

<sup>1</sup> Luminaire Level Lighting Controls (LLLC) can be used as an alternate compliance path. See Section C405.2 for more information.

## Daylight zone requirements

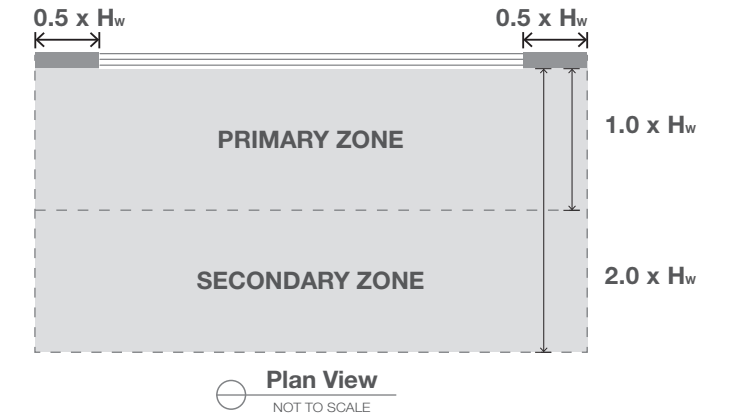
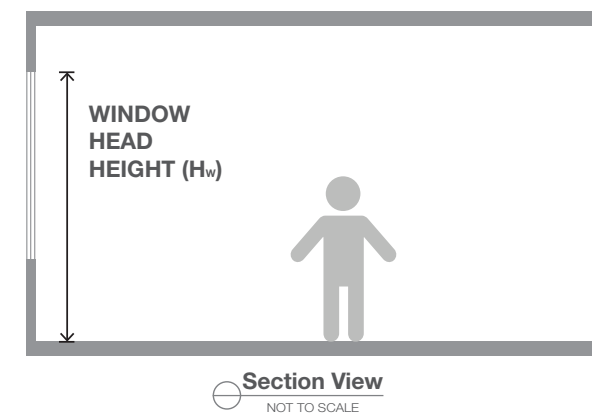
### Daylight Zone Requirements:

Fixtures in the primary and secondary daylight zones must be independently controlled by zone. Sidelighted zones must be controlled separately from toplighted zones.

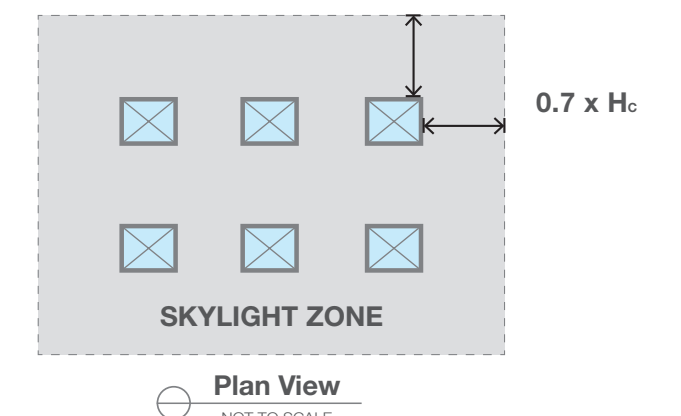
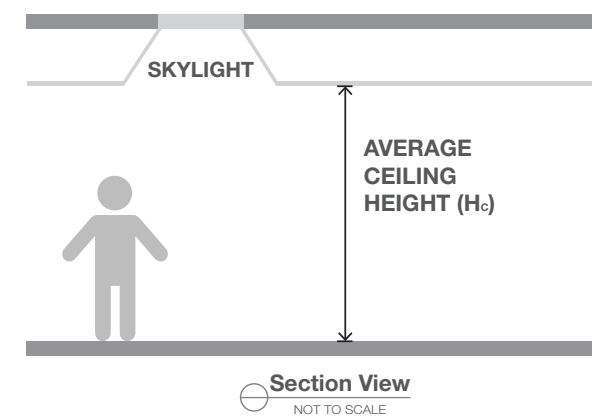
### Daylight Exceptions:

Daylight control is not required when the total lighting power in all daylight zones in a space is less than 150W or when the total glazing area is less than 24 ft<sup>2</sup>.

### Sidelighting (Window)



### Toplighting (Skylight)



This document summarizes the lighting and receptacle control options that meet or exceed the minimum energy code requirements for commercial buildings. It is for information purposes only. It is not meant to replace your state's or local jurisdiction's official energy code. Please refer to your local building energy code or authority having jurisdiction for your precise requirements. Only the authority having jurisdiction can guarantee code compliance.

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