

## 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 compliant options to meet lighting and receptacle control requirements.

Diagram key:

● = New construction

⚙ = Lighting retrofit<sup>1</sup>

⚙ = New construction and retrofit<sup>1</sup>

		Atrium	Classroom, Lecture Hall, Training Room	Conference, Break Room	Corridor <sup>2</sup>	Guestroom	Lobby	Open Office (>250 sq. ft.)	Parking Garage	Private Office (<250 sq. ft.)	Restaurant/Cafeteria, Retail	Restroom	Stairwell <sup>2</sup>	Storage Room	Warehouse and Library Stacks <sup>3</sup>	Facade/Landscape	Other Exterior <sup>4</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				⚙				⚙				⚙		⚙		⚙
Other	Daylight responsive control	●	●	●	●		●	●	●		●	●	●	●	●	●	●	
	Receptacle control	●		●		●		●		●								
	Demand response	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	

1 Retrofit requirements indicated are for lighting alterations which replace existing luminaires with new luminaires without redesign of interior spaces. The solutions shown for interior spaces and parking garages are compliant when the lighting power is reduced by at least 50% in offices, retail spaces and hotels, and by at least 35% in all other space types. Exterior retrofit requirements indicated are for alterations which increase the Lighting Power Density (LPD), or replace at least 50% of the luminaires.

2 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.

3 When typically occupied, the occupancy sensor provides partial OFF functionality. When typically unoccupied, the sensor provides full OFF functionality.

4 Astronomical timeclock shall ensure the lights are off during daylight hours. Occupancy sensor shall provide Full ON and Partial OFF control. Occupancy sensing not required for lighting mounted higher than 24 feet.

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# Title 24 2016: Application Summary

## Code requirement summary

	Minimum control type	Description	Code provision	
<b>Manual Control</b>	Switching	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.	130.1 (a)	
	Multi-level or dimming	Lighting shall be capable of multiple control steps in enclosed spaces 100 sq. ft. or larger. Light level requirements are defined in Table 130.1-A. 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. Outdoor sign lighting on during both day and night must be dimmed during nighttime hours.	130.1 (b) 130.3 (a) 2	
<b>Automatic ON/OFF Control</b>	Timeclock	<b>Interior:</b> Scheduled control, based on time-of-day, turns lighting ON or OFF based on typical occupancy. 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.	130.1 (c) 1 130.2 (c) 1, 2 & 5 130.3 (a) 2 130.3 (c) 1 & 2	
	Occupancy sensor	Automatic control turns lighting ON upon occupancy or OFF after a vacancy of 20 minutes or less. When manual ON is used, provide a vacancy sensor which does not allow for automatic ON.	130.1 (c)	
	Settings	Full ON	When initiated by a timeclock or occupancy sensor, lighting is automatically turned ON to maximum lighting power.	130.1 (c) 1
		Partial ON	When initiated by a timeclock or occupancy sensor, lighting is automatically turned ON to 50% or less of maximum lighting power.	130.1 (c) 5
		Manual ON	Lighting is turned ON manually by an occupant.	130.5 (c) 5
		Full OFF	When initiated by a timeclock or occupancy sensor, lighting is automatically turned OFF.	130.1 (c) 5 130.2 (a)
Partial OFF		When initiated by a timeclock or occupancy sensor, lighting is automatically reduced by at least 50% of maximum lighting power for interior spaces, 20% for parking garages, and 40% for building exteriors. Automatic full OFF also complies for interior spaces..	130.1 (c) 6 & 7 130.2 (c) 3, 4, & 5	
<b>Other</b>	Daylight responsive control	<b>Interior:</b> A sensor which adjusts lighting in response to available daylight is required for sidelight and skylight zones (see the "Daylight zone requirements" diagrams). For interior spaces, there must be at least two light levels between ON and OFF. <b>Exterior:</b> A photosensor can be used as an alternate to the dawn/dusk operation of an astronomical timeclock.	130.1 (d) 130.2 (c) 1 130.3 (a) 2 140.1 (d)	
	Receptacle control	At least 50% of the receptacles shall automatically turn OFF based on typical occupancy or after a vacancy of 20 minutes or less. Each uncontrolled receptacle must have at least one controlled receptacle within 6 feet. Open offices with receptacles in modular furniture must include one controlled receptacle per workstation. Plug-in devices do not comply.	130.5 (d)	
	Demand response	Automatic lighting reduction by a minimum of 15% of total installed lighting power in response to a Demand Response signal is required for new buildings larger than 10,000 sq. ft. or luminaire alterations that increase the lighting power in the enclosed space.	130.1 (e)	

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 130.4).

## Daylight Zone Requirements

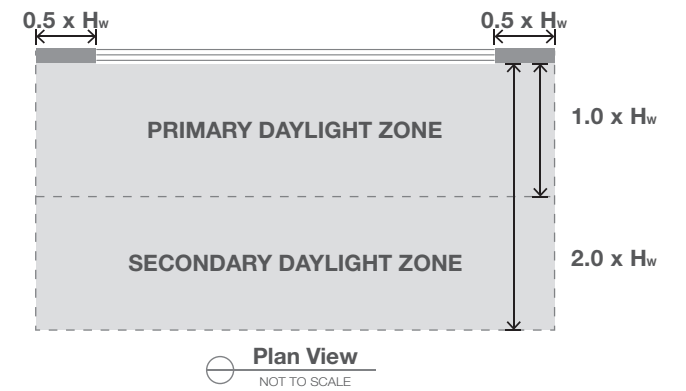
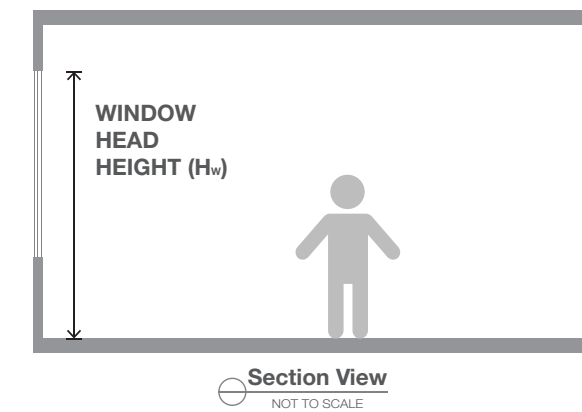
### Daylight Zone Requirements:

Sidelighted daylight zones must be controlled separately from toplighted zones. North, South, East, and West zones must also be controlled separately.

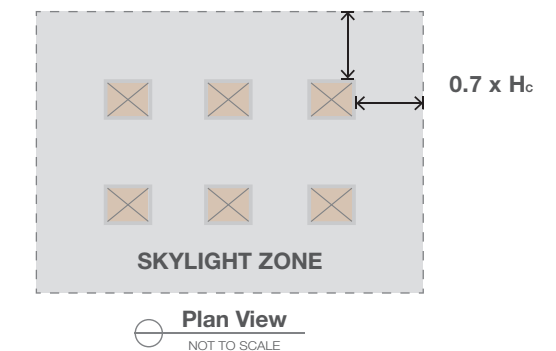
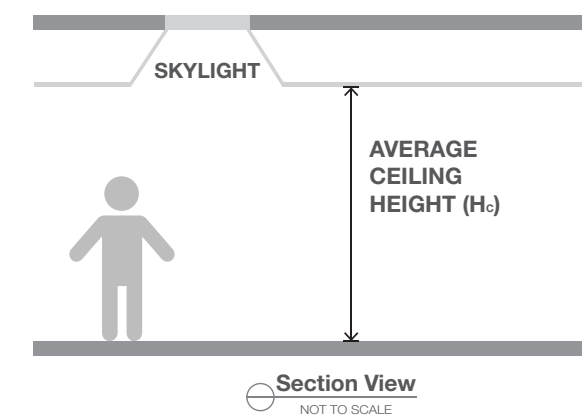
### Daylight Exceptions:

Daylight control is not required when the total lighting power in the skylit and primary sidelit zones is less than 120W (60W for parking garages), or when the total glazing/opening area is 24 sq. ft. or less (36 sq. ft. for parking garages). Other exceptions exist, based on space type, window area, neighboring obstructions, and glass transmittance.

### Sidelighting (Window)



### Toplighting (Skylight)



This document summarizes the lighting and receptacle control 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.