

# ASHRAE 90.1 - 2016 - Energy Code

## Quick reference guide - commercial requirements

Scope: Interior spaces, exterior building features and building grounds. Interior lighting alterations where 20% or more of the connected lighting is altered.

### Automatic off controls

#### 9.4.1.1(h)

##### Automatic full off

- Auto off within 20 min
- Control area can be no more than 5,000ft<sup>2</sup>

##### Primary exceptions:

- Shop and classroom laboratories
- Where auto off would endanger safety or security
- Lighting for 24 / 7 operations

##### Required in:

- Classrooms
- Lecture
- Training rooms
- Conference
- Copy / Print rooms
- Meeting
- Multipurpose rooms
- Lounge
- Break rooms
- Private offices
- Restrooms
- Storage rooms
- Janitorial closets
- Locker rooms
- Office <= 250ft<sup>2</sup>
- Storage rooms >=50 to <= 1,000ft<sup>2</sup>

#### 9.4.1.1(g)

##### Automatic partial off

- Automatically reduce general lighting <=50% within 20min of occupants leaving. Automatic full off complies

##### Primary exceptions:

- All three conditions must be met:
- LPD no more than .8W/ft<sup>2</sup>
  - Spaces lit by HID lamps
  - Light power reduced by >=30% within 20 min after leaving

#### 9.4.1.1(i)

##### Scheduled shut off

- Lighting not already shut off by automatic full off control must be shut off when scheduled unoccupied:
- Time schedule or other control device signal
- Control area <= 25,000ft<sup>2</sup> but not more than one floor
- Override <= 2 hrs and area <+ 5,000ft<sup>2</sup>

##### Primary exceptions:

- Lighting for patient care
- Where auto off would endanger safety or security
- Lighting for 24 / 7 operation

#### 9.4.1.1.(b) and 9.4.1.1(c)

##### Manual or partial auto on

- Lighting shall either be manual on or auto on to no more than 50% of the general lighting

##### Primary exceptions:

- Where full auto on is permitted, manual on or partial auto on is not required

##### Lighting full on only permitted in:

Corridors, Restrooms, Healthcare facility, Storage rooms <50ft<sup>2</sup>, Stairwells, Lobbies, Electrical / mech rooms, Where manual on would endanger safety or security

### Manual controls

#### 9.4.1.1(a)

##### Local control device

- One or more manual control devices in a space:
- Readily accessible
  - Can see lighting controlled from local device (can be on / off switch or dimmer)

##### Primary exceptions:

- Remote control devices permitted for safety or security, provided it has a status pilot light and is labeled to identify lights controlled

##### Is the space <= 10,000ft<sup>2</sup>:

- Yes – control area must be <= 2,500ft<sup>2</sup>
- No – control area must be <= 10,000ft<sup>2</sup>

### Daylight responsive controls

#### 9.4.1.1(e) and 9.4.1.1(f)

##### Daylight-responsive controls

- Either continuous dimming or at least one step between 50-70% and a second step between 20-40% or lowest dimmed level
- Turns off all controlled lighting
  - **Sidelighting** –two independent zones
  - **Toplighting** – single primary zone under skylights and monitors

##### Primary exceptions:

- Sidelight:**
- Adjacent structure obstruction
  - Glazing < 20ft<sup>2</sup>
  - Retail spaces
- Toplight:**
- Obstruction > 1,500 hrs/year
  - Skylight visual transmittance < 0.4
  - Climate zone 8 and lighting < 200W

##### Is Primary daylight area lighting >= 150W or Is Primary & Secondary daylight area lighting >= 300W

- Yes – Daylight control **required** (choose dimming or step control)
- No – Daylight control **NOT required**

#### 9.4.1.1(d)

##### Bi-level control

- Besides on and off, lighting is either continuously dimmed or controlled with at least one step between 30% and 70% of full lighting power

##### Primary exceptions:

- Atriums < 20ft ht
- Corridors
- Elec / mech rooms
- Storerooms
- Loading docks
- Restrooms
- Lobbies

##### Choose one:

- Bi-level switching
- Continuous dimming

### Specific application controls

#### 9.4.1.3

##### Specific application controls

- Lighting that must be separately controlled from the space's general lighting

##### Primary exceptions:

- None

##### Required in:

- Display and accent
- Lighting in display cases
- Supplemental task lighting
- Under cabinet / shelf lighting
- Lighting equipment for sales
- Lighting education or demonstration
- Plant growth
- Food warming

#### 8.4.2

##### Automatic receptacle control

- At least 50% of receptacles and 25% of feeders to modular furniture shall auto off by either:
- Time schedule - <= 2hr override, control area <= 5,000ft<sup>2</sup>
- Occ sensor with 20 min off delay
- Automated signal that shall auto off receptacles within 20 min

##### Primary exceptions:

- Equipment operating 24 / 7
- Where auto control would endanger safety or security

##### Required in:

- Private offices
- Print / copy rooms
- Individual workstations
- Conference rooms
- Break rooms
- Classrooms

## Exterior lighting controls

### 9.4.1.1

#### Exterior lighting controls

- Exterior lighting automatically turn off when daylight is present
- Façade or landscape lighting shall have automatic off no later than midnight or business closing and 6AM or business opening
- All other lighting must be automatically reduced by >30% by
  - No later than midnight to 6AM
  - 1hr after business close to 1hr before open
  - When unoccupied for 15 minutes.

#### Primary exceptions:

- Lighting for covered vehicle entrances / exits and parking structures
- Lighting integral to signage

#### Required in:

- Parking lot
- Area lighting
- Site lighting

### 9.4.1.2

#### Parking garage lighting control

- Automatic lighting shut off per 9.4.1.1(i)
- Automatic reduce lighting >= 30%
  - No activity for 20min
  - Area controlled <= 3,600ft<sup>2</sup>
- Covered vehicle entrances and exits have separate controls to reduce lighting <=50% from sunset to sunrise
- Within 20ft of perimeter wall openings, automatically reduce lighting power in response to daylight.

## Functional testing

### 9.4.3

#### Functional testing

Lighting controls tested for proper calibration, adjustment, programming, and working condition  
Test requirements:

- Occupant sensor controls (9.4.3(a))
- Time-switch controls (9.4.3(b))
- Daylight responsive controls (9.4.3(c))

Testing individual shall not be involved with project design or construction and must provide certifying documentation showing lighting control performance criteria

## How Eaton control systems help meet ASHRAE 90.1 - 2016:

	DLVP	Room Controller	WaveLinX	iLumin Plus	Fifth Light	LumaWatt Pro
9.4.1.1(a)	●	●	●	●	●	●
9.4.1.1(b) & (c)	●	●	●	●	●	●
9.4.1.1(d)	●	●	●	●	●	●
9.4.1.1(e) & (f)	●	●	●	●	●	●
9.4.1.1(g)	●	●	●	●	●	●
9.4.1.1(h)	●	●	●	●	●	●
9.4.1.1(i)	●	●	●	●	●	●
9.4.1.3	●	●	●	●	●	●
8.4.2	●	●	●	●	●	●
9.4.1.2	●	●	●	●	●	●
9.4.1.4	●	●	●	●	●	●
9.4.3	●	●	●	●	●	●



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