

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 5,000ft²

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 <= 250ft²
- Storage rooms >=50 to <= 1,000ft²

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/ft²
 - 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 <= 25,000ft² but not more than one floor
- Override <= 2 hrs and area <+ 5,000ft²

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 <50ft², 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 <= 10,000ft²:

- Yes – control area must be <= 2,500ft²
- No – control area must be <= 10,000ft²

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 < 20ft²
 - 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 <= 5,000ft²
- 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 <= 3,600ft²
- 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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