

# Wattstopper® Quick Guide to ASHRAE 90.1 (2016)

## Commercial Lighting and Electrical Control Requirements

**Scope:** Interior building spaces, exterior lighting powered through building electrical service. Interior space lighting alterations where 20% or more of the connected lighting is altered.

**Exceptions:** Emergency lighting off during normal operation, lighting within dwelling units, lighting required by health or life safety, gas lighting

<p><b>9.4.1.1(a)</b> <b>Local Control Device</b> One or more manual control devices in a space:</p> <ul style="list-style-type: none"> <li>• Readily accessible</li> <li>• Can see lighting controlled from local device (May be an on/off switch or dimmer)</li> </ul>	<p>Space <math>\leq 10,000\text{ft}^2</math>?</p> <p><b>YES</b> Control area must be <math>\leq 2,500\text{ft}^2</math></p> <p><b>NO</b> Control area must be <math>\leq 10,000\text{ft}^2</math></p>	<p><b>Primary Exceptions:</b></p> <ul style="list-style-type: none"> <li>• Remote control device permitted for safety or security, provided it has a status pilot light and is labeled to identify lights controlled</li> </ul>
<p><b>9.4.1.1(b) and 9.4.1.1(c)</b> <b>Manual or Partial Auto On</b></p> <ul style="list-style-type: none"> <li>• Lighting shall either be manual on or auto on to no more than 50% of the general lighting</li> </ul>	<p><b>Lighting Full Auto On Only Permitted for:</b></p> <ul style="list-style-type: none"> <li>- Corridors</li> <li>- Restrooms</li> <li>- Healthcare facility</li> <li>- Storage rooms <math>&lt; 50\text{ft}^2</math></li> <li>- Where manual on would endanger safety or security</li> <li>- Stairwells</li> <li>- Lobbies</li> <li>- Elect/mech rooms</li> </ul>	<p><b>Primary Exceptions:</b></p> <ul style="list-style-type: none"> <li>• Where full auto on is permitted, manual on or partial auto on is not required</li> </ul>
<p><b>9.4.1.1(d)</b> <b>Bi-level Control</b></p> <ul style="list-style-type: none"> <li>• Besides on and off, lighting is either continuously dimmed or controlled with at least one step between 30% and 70% of full lighting power</li> </ul>	<p>Choose between bi-level switching or continuous dimming control</p>	<p><b>Primary Exceptions:</b></p> <ul style="list-style-type: none"> <li>- Atriums <math>&lt; 20\text{ft ht}</math></li> <li>- Corridors</li> <li>- Elect/mech rooms</li> <li>- Storerooms</li> <li>- Loading docks</li> <li>- Restrooms</li> <li>- Lobbies</li> </ul>
<p><b>9.4.1.1(e) and 9.4.1.1(f)</b> <b>Automatic Daylight Responsive Control</b></p> <ul style="list-style-type: none"> <li>• Either continuous dimming or at least one step between 50-70% and a second step between 20-40% or lowest dimmed level</li> <li>• Turns off all controlled lighting</li> </ul> <p><b>Sidelighting</b> – Two independent zones: primary and secondary</p> <p><b>Toplighting</b> – Single primary zone under skylights and monitors</p>	<p>Primary daylight area lighting <math>\geq 150\text{W}</math> or primary and secondary daylight area lighting <math>\geq 300\text{W}</math>?</p> <p><b>YES</b> Daylight Control Required Choose dimming or step control</p> <p><b>NO</b> Daylight Control Not Required</p>	<p><b>Primary Exceptions Sidelight:</b></p> <ul style="list-style-type: none"> <li>• Adjacent structure obstruction</li> <li>• Glazing <math>&lt; 20\text{ft}^2</math></li> <li>• Retail spaces</li> </ul> <p><b>Primary Exceptions Toplight:</b></p> <ul style="list-style-type: none"> <li>• Obstruction <math>&gt; 1,500\text{ hrs/year}</math></li> <li>• Skylight visual transmittance <math>&lt; 0.4</math></li> <li>• Climate zone 8 and lighting <math>&lt; 200\text{W}</math></li> </ul>
<p><b>9.4.1.1(g)</b> <b>Automatic Partial Off</b></p> <ul style="list-style-type: none"> <li>• Automatically reduce general lighting <math>\leq 50\%</math> within 20 minutes of occupants leaving. Automatic Full Off complies. (Occupancy sensor control)</li> </ul>	<p><b>Required for the Following Space Types:</b></p> <ul style="list-style-type: none"> <li>- Corridors (not manufacturing)</li> <li>- Lobbies</li> <li>- Library stacks</li> <li>- Storage rooms <math>&gt; 1,000\text{ft}^2</math></li> <li>- Classroom labs</li> <li>- Stairwells</li> <li>- Warehouses</li> </ul>	<p><b>Primary Exceptions:</b></p> <p>All three conditions must be met:</p> <ol style="list-style-type: none"> <li>1. LPD no more than <math>0.8\text{W}/\text{ft}^2</math></li> <li>2. Spaces lit by HID lamps</li> <li>3. Light power reduced by <math>\geq 30\%</math> within 20 minutes after leaving</li> </ol>
<p><b>9.4.1.1(h)</b> <b>Automatic Full Off</b></p> <ul style="list-style-type: none"> <li>• All lighting must auto off within 20 minutes of occupants leaving. Control device shall control an area no larger than <math>5,000\text{ft}^2</math>. (Occupancy sensor control)</li> </ul>	<p><b>Required for the Following Space Types:</b></p> <ul style="list-style-type: none"> <li>- Classroom/training rooms</li> <li>- Lecture Hall</li> <li>- Conference/meeting rooms</li> <li>- Multipurpose rooms</li> <li>- Lounge/break rooms</li> <li>- Fitting/dressing rooms</li> <li>- Copy/print rooms</li> <li>- Storage rooms <math>\geq 50</math> to <math>\leq 1,000\text{ft}^2</math></li> <li>- Locker rooms</li> <li>- Restrooms</li> <li>- Offices <math>\leq 250\text{ft}^2</math></li> </ul>	<p><b>Primary Exceptions:</b></p> <ul style="list-style-type: none"> <li>• Shop and classroom laboratories</li> <li>• Where auto off would endanger safety or security</li> <li>• Lighting for 24/7 operation</li> </ul>
<p><b>9.4.1.1(i)</b> <b>Scheduled Shut Off</b></p> <p>Lighting not already shut off by Automatic Full Off control must be shut off when scheduled unoccupied:</p> <ul style="list-style-type: none"> <li>• Time schedule or other control device signal</li> <li>• Control area <math>\leq 25,000\text{ft}^2</math> but not more than one floor</li> <li>• Override <math>\leq 2</math> hours and area <math>\leq 5,000\text{ft}^2</math></li> </ul>	<p>Required for spaces not already controlled by Automatic Full Off (9.4.1.1(h))</p>	<p><b>Primary Exceptions:</b></p> <ul style="list-style-type: none"> <li>• Lighting for patient care</li> <li>• Where auto off would endanger safety or security</li> <li>• Lighting for 24/7 operation</li> </ul>
<p><b>9.4.1.3</b> <b>Special Application Lighting</b></p> <ul style="list-style-type: none"> <li>• Lighting that must be separately controlled from the space's general lighting</li> </ul>	<p><b>Required for the Following Lighting:</b></p> <ul style="list-style-type: none"> <li>- Display or accent</li> <li>- Display cases</li> <li>- Food warming</li> <li>- Lighting for sale</li> <li>- Lighting for education</li> <li>- Plant growth</li> <li>- Supplemental task</li> <li>- Under shelf</li> <li>- Under cabinet</li> </ul>	<p><b>Primary Exceptions:</b></p> <p>None</p>
<p><b>8.4.2</b> <b>Automatic Receptacle Control</b></p> <p>At least 50% of receptacles and 25% of feeders to modular furniture shall auto off by either:</p> <ul style="list-style-type: none"> <li>• Time schedule, <math>\leq 2</math> hour override, control area <math>\leq 5,000\text{ft}^2</math></li> <li>• Occupancy sensor with 20 minute off delay</li> <li>• Automated signal that shall auto off receptacles within 20 minutes of occupants leaving</li> </ul>	<p><b>Required for the Following Space Types:</b></p> <ul style="list-style-type: none"> <li>- Private offices</li> <li>- Print/copy rooms</li> <li>- Individual workstations</li> <li>- Conference rooms</li> <li>- Break rooms</li> <li>- Classrooms</li> </ul>	<p><b>Primary Exceptions:</b></p> <ul style="list-style-type: none"> <li>• Equipment operating 24/7</li> <li>• Where auto control would endanger safety or security</li> </ul>

### Other Lighting Control Requirements

#### 9.4.1.2

##### Parking Garage Lighting Control

- Automatic lighting shut off per 9.4.1.1(i)
- Automatically reduce lighting  $\geq 50\%$  when no activity detected within 20 minutes and with the area controlled  $\leq 3,600\text{ft}^2$
- Covered vehicle entrances and exits have separate controls to reduce lighting  $\leq 50\%$  from sunset to sunrise
- Within 20ft of perimeter wall openings, automatically reduce lighting power in response to daylight

#### 9.4.1.3(b)

##### Guestroom Control

Auto off all lighting and switched receptacles within 20 minutes of occupants leaving

##### Exceptions:

Lighting and switched receptacles controlled by a captive key system

##### Bathroom Control

Guestroom bathrooms have separate control to auto off bathroom lighting within 30 minutes of occupants leaving

##### Bathroom Exceptions:

Nightlights up to 5W per bathroom

#### 9.4.1.4

##### Exterior Lighting Controls

- Auto off when daylight is available
- Façade, landscape auto off no later than midnight or closing and 6AM or opening
- Reduce other lighting and signage  $\geq 50\%$  no later than midnight or within one hour after operations end to 6AM or opening, or when no activity detected for  $> 15$  minutes
- Parking lights  $> 78\text{W}$  with mounting heights  $\leq 24\text{ft}$  must reduce power  $\geq 50\%$  when no activity detected for  $> 15$  minutes. Control zone  $\leq 1500\text{W}$

##### Primary Exceptions:

- Covered vehicle entrances or for safety, security, or eye adaptation

#### 9.4.3

##### Functional Testing

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

- Certify occupancy sensor parameters (see 9.4.3(a))
- Confirm and verify automatic time switch parameters (see 9.4.3(b))
- Verify daylight controls meet criteria (see 9.4.3(c))

Testing individual shall not be involved with project design or construction and must provide certifying document that lighting controls meet the performance criteria

Note: This infographic is for informational purposes only. Always refer to the code for specific requirements or contact your local Wattstopper representative. ASHRAE is an acronym for the American Society of Heating, Refrigeration, and Air Conditioning Engineers.



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