

Oregon Non-Residential Building Energy Code



OREGON
DEPARTMENT OF
ENERGY

Daylighting Controls

Effective design using gentle, diffuse daylight can provide building occupants with a natural quality of light that has been proven to improve productivity and reduce incidences of illness in workers, students, and teachers. Automatically reducing electric lighting in response to natural daylight can save significant energy. But using daylight without careful consideration of glare, heat gain, or integration with electric lighting can be counter productive.

The Oregon Energy Code only requires automatic daylighting controls in two kinds of nonresidential spaces—classrooms or atriums. An atrium is defined as follows:

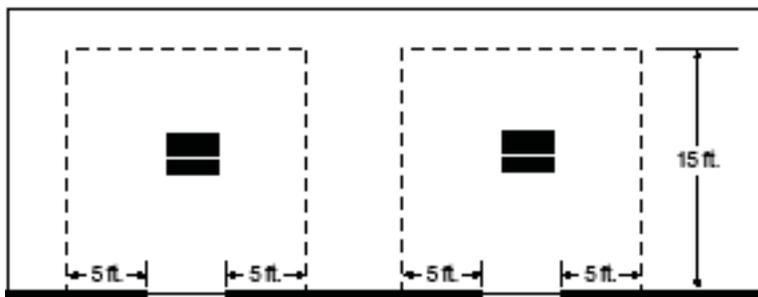
“An opening connecting two or more stories other than enclosed stairways, elevators, hoistways, escalators, plumbing, electrical, air-conditioning, or other equipment, which is closed at the top and not defined as a mall. Stories, as used in this definition, do not include balconies within assembly groups or mezzanines that comply with section 505.”

In these spaces, two situations will trigger requirements for daylighting controls according to section 1313.3.1.3:

- If there are any skylights in the classroom or atrium
- or
- When the window-to-exterior wall ratio (measured on the *inside* of the exterior wall) in the classroom or atrium is greater than 50%.

Calculating the Daylit Zone

If your space meets the criteria above, daylight sensing controls are required for luminaires that fall within the daylit zones. The figures below show how to calculate daylit zones for both windows and skylights according to sections 1313.3.1.3.1 and 1313.3.1.3.2.



Daylit Zone – Windows

Code Language

1313.3.1.3 Daylighting controls. Daylighting controls meeting the requirements of this section shall be required for all classrooms and atriums.

1313.3.1.3.1 Daylighting requirements for windows. Classrooms and atriums with a window to exterior wall ratio of 50 percent or greater shall use automatic daylight sensing controls for all permanently installed luminaires 15 feet (4572 mm) inward and 5 feet (1524 mm) on each side of the windows. For the purpose of this section, window to wall ratio is measured on the inside room of the exterior walls.

1313.3.1.3.2 Daylighting requirements for skylights. In classrooms and atriums with skylights, monitors or other fenestration at or above ceiling level, all permanent luminaires within an area equal to the footprint of the ceiling opening plus the floor to ceiling height in each direction of the opening, shall be controlled by automatic daylight sensing controls.

1313.3.1.3.3 Automatic daylight sensing controls. When required by this section, automatic daylight sensing controls shall:

1. Be capable of reducing the light output of the controlled luminaires by at least one-half while maintaining a uniform level of illuminance,
2. Provide continuous dimming of the controlled luminaires,
3. Control only luminaires within the daylit area, and
4. Incorporate time-delay circuits to prevent cycling of light level changes of less than three minutes.

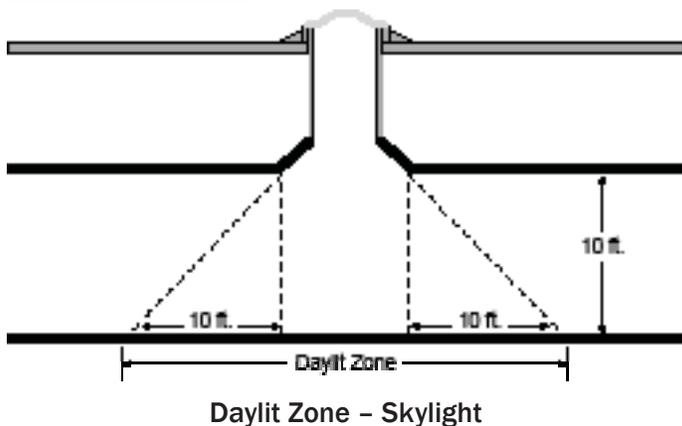
Exception:

Atriums may utilize step switching or other non-continuous dimming devices provided they have adjustable separation (deadband) of on and off points to prevent short cycling.

Documentation:



To document compliance with this section of code, fill out Compliance Form 5a.



Daylight Sensing Controls

For classrooms, the system must provide continuous dimming which requires dimming ballasts. Atriums are permitted to use stepped or on/off control provided they have adjustable separation (deadband) of on and off points to prevent short cycling.

Additions and Alterations [1313.6]

Any lighting systems installed in additions to or alterations of existing buildings must comply with the daylighting control requirements of Section 1313.3.1.3. However, if your alterations replace less than 50% of the luminaires/fixtures and do not increase the existing total connected lighting power, then your project is exempt and does not need to add lighting controls for that space.

Find Out More

Copies of Code:

Oregon Building Officials Association
phone: 503-873-1157 fax: 503-373-9389

Technical Support:

Oregon Department of Energy
625 Marion Street NE phone: 503-378-4040
Salem, OR 97301-3737 toll free: 800-221-8035
www.oregon.gov/energy fax: 503-373-7806

This fact sheet was developed with funding from the Northwest Energy Efficiency Alliance and the Oregon Department of Energy under contract DE-FG51-02R021378.



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Photo on page 1 c/o Warren Gretz, DOE/NREL

65/05 ODOE CF-125/Fact Sheet 1

Non-residential code lighting Fact Sheets include:

- Exterior Lighting and Controls • Interior Lighting Controls
- Interior Connected Lighting Power • Daylighting Controls

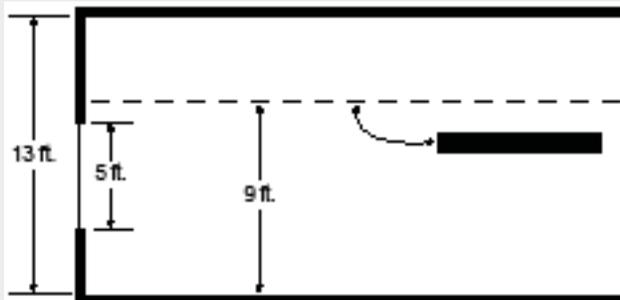
Examples

Q I want to use automatic daylighting controls in spaces other than a classroom or atrium. If I do, can I install more lighting power than would otherwise be permitted?

A No, you do not receive any “tradeoff credit” for installing automatic daylighting controls when not required by code. However, you may be eligible for incentives or tax credits from:

- The Energy Trust of Oregon (www.energytrust.org/business/index.html)
- The Oregon Department of Energy’s Business Energy Tax Program (<http://egov.oregon.gov/ENERGY/CONS/BUS/BETC.shtml>)
- Utility incentives (check with your local utility).

Q If I have a 5-ft-high continuous window in a space designed like the figure below, am I required to use daylighting controls or not?

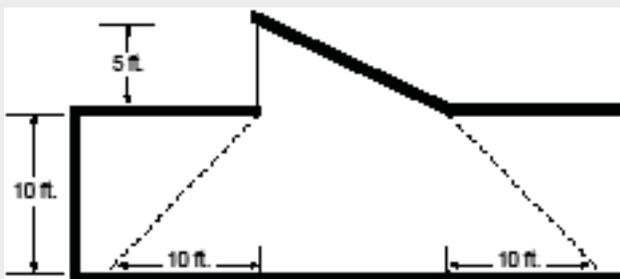


Measurements

A In this configuration, if the window were a continuous window across the entire space, the window-to-wall ratio WOULD be greater than 50% and daylighting controls would be necessary for luminaires in the daylit zone. This is because the ratio is calculated using the inside room measurements and *not* the exterior wall measurements.

Q My design incorporates a roof monitor. How do I calculate the daylit zone?

A With a roof monitor, the ceiling opening is the same as for a skylight (see figure below). Do not use the vertical opening where the glazing is installed for daylit zone measurements.



Daylit Zone – Roof Monitor