

Understanding Daylight-Responsive Controls (DRCs)

This guide is based on the 2021 IECC

What Are Daylight-Responsive Controls?

Daylight-responsive controls (DRCs) are lighting controls that automatically dim or turn off electric lighting when enough natural daylight is present. They use sensors to “read” the light level in a space and adjust electric lighting so the room stays comfortably lit without wasting energy.

In simple terms: **When the sun is doing the work, the controls dial the lights back.**

The IECC requires DRCs in certain spaces because they reliably reduce lighting loads in rooms that receive enough daylight to justify automated control.

What do they do:

- Dim lights when daylight is strong
- **Brighten lights when daylight fades**
- Keep lighting levels consistent
- **Save energy and reduce utility costs**

Understanding Daylight Zones

Before you can determine whether DRCs are required, you must know which areas of the building count as daylight zones. The code defines three main types: sidelighted, toplit, and atrium zones.

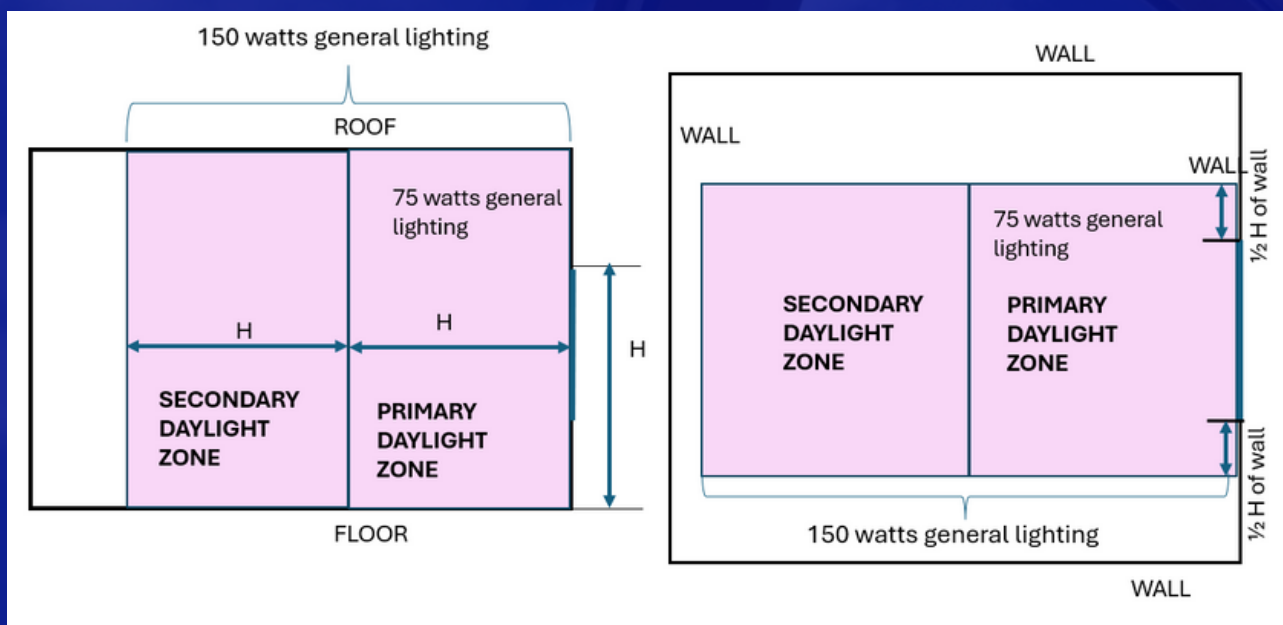
Sidelit Daylight Zones C405.2.4.2 (Windows and Rooftop Monitors)

Sidelighted zones are areas adjacent to vertical fenestration (windows or rooftop monitors) that meet specific geometric and performance requirements.

Primary Sidelit Daylight Zone (wall fenestration) – C405.2.4.2(1)

Extends laterally to the nearest full-height wall or up to $1.0 \times$ the height from the floor to the top of the fenestration.

Extends longitudinally to the nearest wall or up to $0.5 \times$ that height.



Secondary Sidelit Daylight Zone – C405.2.4.2(3)

Immediately follows the primary zone.

Extends laterally up to $2.0 \times$ the fenestration height or until a wall, and uses the same depth limit as the primary zone.



Understanding Daylight Zones

Sidelit Daylight Zone Under Rooftop Monitors – C405.2.4.2(2)

Extends laterally and longitudinally until hitting an obstruction taller than $0.7 \times$ the ceiling height, or defined multiples of the fenestration height from the floor.

Additional Zone Requirements – C405.2.4.2(4–7)

A sidelighted zone only qualifies if all the following are true:

Fenestration area is ≥ 24 sq ft (C405.2.4.2(4))

External obstructions do not block daylight (C405.2.4.2(5))

Visible transmittance (VT) is ≥ 0.20 (C405.2.4.2(6))

Overhang projection factor limits are met (C405.2.4.2(7))

Toplit Daylight Zones (Section C405.2.4.3)

These zones lie beneath roof fenestration assemblies such as skylights or roof monitors.

A toplit daylight zone is defined by:

- Extending outward to an obstruction taller than $0.7 \times$ ceiling height, or up to that distance if unobstructed (C405.2.4.3(1)).
- Receiving direct sunlight at the summer-solstice peak angle (C405.2.4.3(2)).
- Meeting the daylight performance ratio:
- $(VT \times \text{roof fenestration area}) \div \text{daylight zone area} \geq 0.008$ (C405.2.4.3(3)).

Atrium Zones (C405.2.4.4)

Daylight zones in atriums are defined only at:

- The top floor surrounding the atrium opening, and
- The floor of the atrium space itself.

Intermediate floors are not considered daylight zones.

When Are DRCs Required? (Section C405.2.4)

Once daylight zones are identified, C405.2.4 establishes when daylight-responsive controls must be installed based on the amount of general lighting within those zones.

Daylight Zone Type	Lighting Threshold
Primary sidelighted (next to windows)	> 150 W
All sidelighted zones combined	> 300 W
Toplit zones (skylights/monitors)	> 150 W

Where they're NOT required:

- ❌ Patient-care areas in health care facilities
- ❌ First-floor sidelighted zones in Groups A-2 and M
- ❌ New buildings already below the adjusted lighting

When DRCs are required, C405.2.4.1 outlines their functional performance. The control scheme is one of the most important qualities of the system and it requires proper calibration to achieve its goal to reduce energy use. The code aligns these sections to take advantage of occupancies and uses that can best benefit from the lighting controls.



How Must the Controls Operate?

(Section C405.2.4.1)

Control Separation Requirements

- Toplit zones must be controlled independently from sidelighted zones (C405.2.4.1 Item 1).
- Primary and secondary sidelighted zones require separate control (Item 2).
- Sidelighted zones facing different orientations (within 45° of N, E, S, W) must be controlled independently (Item 8).

Calibration & Accessibility

- Controls must be calibratable from within the space (Item 3).
- Calibration mechanisms must be readily accessible (Item 4).

Performance Requirements

- Must dim lights continuously from full output down to 15% or lower (Item 5).
- Must be capable of shutting off all controlled lights (Item 6).
- When occupancy sensors reduce lighting to an unoccupied setpoint, DRCs may dim further but cannot increase lighting above that unoccupied setpoint (Item 7).

Exceptions (C405.2.4.1 Exceptions 1–2)

- Within primary sidelighted zones across different orientations
- Within secondary sidelighted zones across different orientations



How Skylight Rules Tie In (Sections C402.4.1, C402.4.1.2, C402.4.3.1)

The IECC's toplighting and fenestration rules interact closely with daylight-responsive controls.

Skylight Area Limits (C402.4.1 and C402.4.1.2)

- Baseline: skylights may be up to 3% of the gross floor area they serve (C402.4.1).
- If DRCs are installed in all toplit daylight zones, the allowable skylight area increases to 6% (C402.4.1.2).

SHGC Allowance with DRCs (C402.4.3.1)

Skylights may have a solar heat gain coefficient (SHGC) as high as 0.60 when compliant DRCs are installed (C402.4.3.1).

When Skylights Are Required (C402.4)

Section C402.4 requires skylights when all three of the following conditions are met:

1. The space is 2,500 sq ft or larger,
2. The ceiling height is 15 ft or higher, and
3. The occupancy type is one identified by the code as suitable for toplighting (e.g., warehouses, gyms, big-box retail, distribution areas).



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