



**BSR/ASHRAE/IES Addendum cw
to ANSI/ASHRAE/IES Standard 90.1-2016**

Public Review Draft

**Proposed Addendum cw to
Standard 90.1-2016, Energy Standard
for Buildings Except Low-Rise
Residential Buildings**

**First Public Review (May 2019)
(Draft Shows Proposed Changes to Current Standard)**

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FOREWORD

This proposal changes the daylight responsive requirements from continuous dimming **or** stepped control to continuous dimming required for all spaces. The proposal also adds a definition for continuous dimming that is very similar to the NEMA LSD-64 2014 definition.

Stepped output control currently required in the standard was written around fluorescent technology with three lamp fixtures. Lamps were switched on multiple ballasts (e.g. two lamps connected to one ballast and the third lamp connected to a second ballast with separate switches and wiring). A dimming ballast was not required. Now, dimmable LED drivers are standard in current LED technology and there are no cost implications to updating these requirements. Dimmable fluorescent ballasts are available in the market.

This proposal adds a control system characteristic to clarify how daylight responsive controls must respond during unoccupied conditions.

Table 9.6.3 Control Factors Used in Calculating Additional Interior Lighting Power Allowances is amended to eliminate the adder for continuous dimming in the secondary daylight zone.

[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~striketrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]

Addendum cw to 90.1-2016

Modify the standard as follows (IP and SI Units)

3.2 Definitions

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...

continuous dimming: a lighting control strategy that varies the light output of a lighting system over a continuous range from full light output to a minimum light output in imperceptible steps without flickering.

9.4.1 Lighting Control

Building lighting controls shall be installed to meet the provisions of Sections [9.4.1.1](#), [9.4.1.2](#), [9.4.1.3](#), and [9.4.1.4](#).

9.4.1.1 Interior Lighting Controls

...

e. *Automatic daylight responsive controls for sidelighting:* ...

The *control system* shall have the following characteristics:

1. The calibration adjustment *control* shall be located no higher than 11 ft (3.4 m) above the finished *floor*. Calibration shall not require the physical presence of a person at the sensor while it is processing.
 2. The photocontrol shall reduce electric lighting power in response to available daylight using continuous dimming to 20% or less and off. ~~or with at least one *control* point between 50% and 70% of design lighting power, a second *control* point between 20% and 40% of design lighting power or the lowest dimming level the technology allows, and a third *control* point that turns off all the controlled lighting.~~
 3. When an *automatic* partial OFF control has reduced the lighting power to the unoccupied setpoint in accordance with Section 9.4.1(g), the daylight responsive control shall adjust the electric light in response to available daylight, but it shall not allow the lighting power to be above the unoccupied setpoint.
 3. ~~The calibration shall not require the physical presence of a person at the sensor while the calibration is processing.~~
- ...

f. *Automatic daylight responsive controls for toplighting:* ...

The *control system* shall have the following characteristics:

1. The calibration adjustment *control* shall be located no higher than 11 ft (3.4 m) above the finished *floor*. Calibration shall not require the physical presence of a person at the sensor while it is processing.
 - 1-2. The photocontrol shall reduce electric lighting power in response to available daylight using continuous dimming to 20% or less and off. ~~or with at least one *control* point between 50% and 70% of design lighting power, a second *control* point between 20% and 40% of design lighting power or the lowest dimming level the technology allows, and a third *control* point that turns off all the controlled lighting.~~
 3. When an *automatic* partial OFF control has reduced the lighting power to the unoccupied setpoint in accordance with Section 9.4.1(g), the daylight responsive control shall adjust the electric light in response to available daylight, but it shall not allow the lighting power to be above the unoccupied setpoint.
 2. ~~The calibration shall not require the physical presence of a person at the sensor while the calibration is processing.~~
 - 3-4. *General lighting* in overlapping toplighted and sidelighted *daylight areas* shall be controlled together with *general lighting* in the *daylight area under skylights* or *daylight area under roof monitors*.
- ...

Table 9.6.3 Control Factors Used in Calculating Additional *Interior Lighting Power Allowance*

Space Type

Additional Control Method (in Addition to Mandatory Requirements)	Open Office	Private Office	Conference Room, Meeting Room, Classroom (Lecture/ Training)	Retail Sales Area	Lobby, Atrium, Dining Area, Corridors/ Stairways, Gym/Pool, Mall Concourse, Parking Garage
<i>Manual</i> , continuous dimming <i>control</i> or programmable multilevel dimming <i>control</i>	0.05	0.05	0.10	0.10	0
Programmable multilevel dimming <i>control</i> using programmable time scheduling	0.05	0.05	0.10	0.10	0.10
<i>Occupancy sensors</i> controlling the downlight component of workstation specific <i>luminaires</i> with continuous dimming to off capabilities	0.25 ^a	0	0	0	0
<i>Occupancy sensors</i> controlling the downlight component of workstation specific <i>luminaires</i> with continuous dimming to off operation, in combination with personal continuous dimming <i>control</i> of downlight illumination by workstation occupant	0.30 ^{a,b}	0	0	0	0
<i>Automatic continuous daylight dimming in secondary sidelighted areas</i>	0.10 ^e	0.10 ^e	0.10 ^e	0.10 ^e	0.10 ^e

- a. *Control* factor is limited to workstation-specific *luminaires* in partitioned single occupant work *spaces* contained within an open office environment (i.e. direct-indirect *luminaires* with separately controlled downlight and uplight components, with the downward component providing illumination to a single occupant in an open plan workstation). Within 30 minutes of the occupant leaving the *space*, the downward component shall continuously dim to off over a minimum of two minutes. Upon the occupant entering the *space*, the downward component shall turn on at the minimum level and continuously raise the illumination to a preset level over a minimum of 30 seconds. The uplight component of workstation specific *luminaire* shall comply with Section 9.4.1.1(h) (*automatic* full off).
- b. In addition to the requirements described in footnote (a), the *control* shall allow the occupant to select their preferred light level via a personal computer, handheld device, or similarly accessible device located within the workstation.
- c. ~~*Control* factors may not be used if *controls* are used to satisfy exceptions to Section 5.5.4.2.3~~