

# STANDARD

**ASHRAE/IES Addendum c to  
ASHRAE/IES Standard 90.1-2022**

# **Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings**

Approved by ASHRAE and the American National Standards Institute on July 31, 2024, and by the Illuminating Engineering Society on July 8, 2024.

This addendum was approved by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. Instructions for how to submit a change can be found on the ASHRAE® website (<https://www.ashrae.org/continuous-maintenance>).

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ASHRAE obtains consensus through participation of its national and international members, associated societies, and public review.

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## FOREWORD

*Standard 90.1 has required a temperature dead band between heating and cooling set points since 1989. The dead band must be capable of being adjusted to at least 5°F (3°C). In 2016, a requirement was added to set the dead band to 5°F (3°C). However, like any set point, the dead band is adjustable and is often set to a lower value, and the standard does not have a lower limit on the dead band. Furthermore, many thermostats with displays and set-point adjustment capability only display only the heating or cooling set point, requiring the user to select the one they want to see.*

*For systems with manual changeover between heating and cooling, the displayed value is that of the active mode, so there is no confusion. However, for systems that automatically changeover between heating and cooling, users often do not know what set point they are adjusting. In some systems, the displayed set point is between the two set points; in others, it is the cooling set point with the heating set point equal to the cooling set point less a dead band that is typically not user adjustable. Either way, when the user adjusts the set point, both heating and cooling move together, maintaining the currently programmed dead band. But if the programmed dead band is set to a low value, such as 1°F (0.5°C), any set-point adjustment more than 1°F (0.5°C) will cause the system to change modes, though that may not be what the occupant intended. A classic example is a hotel room where the housekeeper often turns the set point down to 65°F, then the guest arrives and wants the room to be warmer. By changing the set point to 70°F, the system switches to heating, because the internal dead band is almost always set to a low value. The more efficient operation would be to raise the cooling set point but not the heating set point and allow the space to naturally rise to 70°F without any heating.*

*Another example is set-point adjustment for demand response. When utilities (or local demand limiting logic) indicate a need to reduce demand, cooling set points are adjusted upward while heating set points are adjusted downward; this cannot happen if systems have the two set points tied together, and if they are, raising the cooling set point might push a zone into heating and inadvertently increase electricity demand for systems using electricity for heating.*

*To address these issues, this addendum updates Standard 90.1 as follows:*

- a. *Separate set points are now required for heating and cooling, each individually adjusted without one being tied to the other.*
- b. *A minimum of 1°F (0.5°C) has been established for the dead band between heating and cooling.*
- c. *The exception for occupancies needing tighter control is now only an exception to the dead band configuration value, set to 1°F (0.5°C) instead of 5°F (3°C). There is no reason for these occupancies to not have the capability of separate set points and wider dead band values. Because these occupancies generally use the same control systems as other occupancies, changing this exception will have minimal or no impact on control system hardware and software.*
- d. *Where set points are displayed and user adjustable, either both set points must be displayed or the active set point and its mode (heating or cooling) must be displayed.*

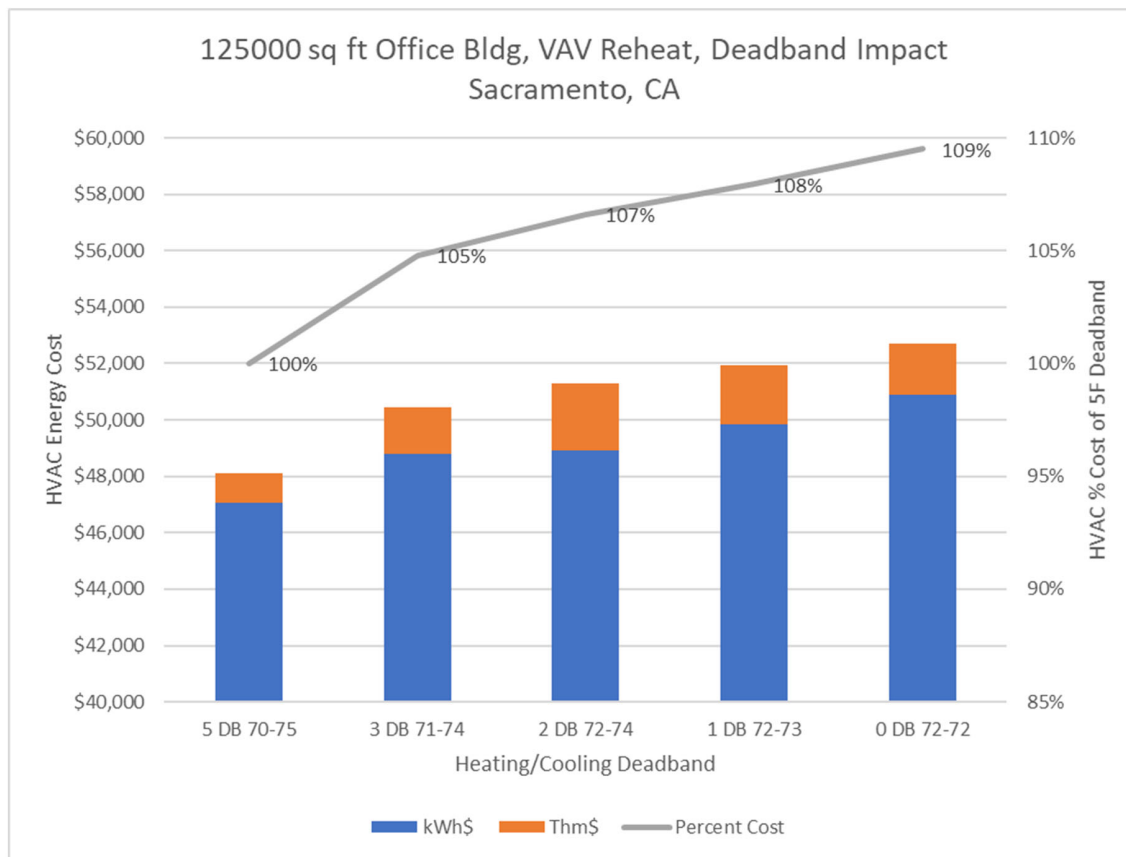
*Note that ASHRAE Guideline 36, Advanced Sequences of Control, was written assuming this capability.*

*The energy cost impact of various dead bands was simulated for an office in Sacramento (Zone 3c, see figure below), and the impact is similar in other applications and climates—the more extreme the climate, the greater the savings.*

## The Capability Exists in Most Thermostats and Control Systems

*Most modern controllers already have dual set points, because the dead band capability has been a requirement of Standard 90.1 since 1989. Additionally, many already have displays that meet the new requirements. Direct digital control systems generally have configurable displays that can be readily modified to meet the proposed requirements. Therefore, the primary first-cost impact will be to modify the displays of non-DDC (firmware) thermostats, but these are low-cost thermostats to begin with and also the thermostats that this addendum is targeting.*

**Note:** In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~striketrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.



### Addendum c to Standard 90.1-2022

*Modify the standard as follows for IP and SI units:*

- 6.4.3.1.2 Dead Band.** Where used to control both heating and cooling, zone *thermostatic controls* shall
- have separate *set points* for heating and cooling, each individually adjustable.
  - be capable of and initially configured to provide a temperature range or *dead band* between the two *set points* of at least not less than 5°F (3°C) within which the supply of heating and cooling energy to the zone is shut off or reduced to a minimum, and
  - have a *dead band* of not less than 1°F (0.5°C) when *set points* are adjusted.

**Exceptions to 6.4.3.1.2:**

- Thermostats* that require manual changeover between heating and cooling modes.
- Special occupancy or special applications where applicable codes or accreditation standards do not permit wider temperature ranges are permitted to be configured to not less than 1°F (0.5°C) *dead band*, and are approved by the authority having jurisdiction.

**6.4.3.1.3 Set-Point Adjustment and Display.** Where occupied *thermostatic control set points* are capable of being adjusted by occupants or *HVAC system operators*, the adjustment shall be independent for the heating *set point* and the cooling *set point*; when one *set point* is changed, the other shall not change except as needed to maintain the minimum *dead band* required by Section 6.4.3.1.2. When occupied *set points* are adjusted, *set points* for setback operation in accordance with Section 6.4.3.3.2 shall not change. For *thermostatic controls* that display *set points*, both the heating and cooling *set points* shall be displayed simultaneously, or the *set point* of the currently active mode (heating or cooling) shall be displayed along with an indication of that mode.

**6.4.3.2 Set-Point Overlap Restriction.** Where heating and cooling to a zone are controlled by separate zone *thermostatic controls* located within the zone, means (such as, but not limited to, mechanical stops, limit switches, ~~mechanical stops~~; or, for DDC systems, software programming,) shall be provided to prevent the heating set point from exceeding the cooling set point, minus any applicable proportional ~~the~~ *dead band* required by Section 6.4.3.1.2.

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ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted Standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the Standards and Guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive Technical Committee structure, continue to generate up-to-date Standards and Guidelines where appropriate and adopt, recommend, and promote those new and revised Standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date Standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating Standards and Guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.

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As an industry leader in research, standards writing, publishing, certification, and continuing education, ASHRAE and its members are dedicated to promoting a healthy and sustainable built environment for all, through strategic partnerships with organizations in the HVAC&R community and across related industries.

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