



**BSR/ASHRAE/IES Addendum f
to ANSI/ASHRAE/IES Standard 90.1-2022**

Public Review Draft

Proposed Addendum f to Standard 90.1-2022, Energy Standard for Sites and Buildings Except Low- Rise Residential Buildings

**First Public Review (March 2023)
(Draft Shows Proposed Changes to Current Standard)**

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FOREWORD

Building Performance Factors (BPF) in Table 4.2.1.1 account for efficiency gains due to the introduction of energy credits. However, the existing modeling rules of the Performance Rating Method (Appendix G) do not allow capturing energy savings from some of the systems, components and controls that are addressed by new energy credits in Section 11. As a result, projects that specify such technologies are not able to claim the associated credits. The proposed addendum addresses that gap. The new modeling requirements proposed for the Performance Rating Method (Appendix G) and Energy Cost Budget Method (Section 12) reflect the methodologies used to assign weights to energy credits, as described in the [PNNL Technical Support Document](#).

This addendum impacts an optional performance path in the standard designed to provide increased flexibility and therefore was not subjected to cost effectiveness analysis.

[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 f to 90.1-2022

Modify the standard as follows for IP (and SI) Units:

Table 12.5.1 Modeling Requirements for Calculating Design Energy Cost and Energy Cost Budget

| Proposed Design (Column A) Design Energy Cost (DEC) | Budget Building Design (Column B) Energy Cost Budget (ECB) |
|--|---|
| | |
| 4. Schedules | |
| <p>The schedule types listed in Section 11.4.1.1(b) shall be required input. The schedules shall be typical of the <i>proposed design</i> as determined by the designer and approved by the <i>authority having jurisdiction</i>. Required schedules shall be identical for the <i>proposed design</i> and <i>budget building design</i>.</p> <p>Temperature and Humidity Schedules. Temperature and humidity <i>control set points</i> and schedules as well as <i>temperature control throttling range</i> shall be the same for <i>proposed design</i> and <i>baseline building design</i>.</p> <p>HVAC Fan Schedules. Schedules for HVAC fans that provide <i>outdoor air for ventilation</i> shall run continuously whenever <i>spaces</i> are occupied and shall be cycled ON and OFF to meet heating and cooling loads during unoccupied hours.</p> <p>Exceptions:</p> <ol style="list-style-type: none"> Where no heating and/or cooling <i>system</i> is to be installed, and a heating or cooling <i>system</i> is being simulated only to meet the requirements described in this table, heating and/or cooling <i>system</i> fans shall not be simulated as running continuously during occupied hours but shall be cycled ON and OFF to meet heating and cooling loads during all hours. HVAC fans shall remain on during occupied and unoccupied hours in <i>spaces</i> that have health- and safety-mandated minimum <i>ventilation</i> requirements during unoccupied hours. Dedicated outdoor air supply fans shall stay off during unoccupied hours. <p>HVAC fans shall remain on during occupied and unoccupied hours in <i>systems</i> primarily serving <i>computer rooms</i>.</p> <p>[...]</p> | <p>Same as <i>proposed design</i>.</p> <p>Exception: <u>When the proposed building design includes HVAC systems serving dwelling units or sleeping units that have controls meeting requirements of Section 11.5.2.2.4 “H04: Residential Space HVAC Control”:</u></p> <p><u>(1) The budget building design shall be modeled using heating temperature setback of 5°F (3°C) higher than in the proposed design but not higher than the occupied temperature for a maximum of 9 hours per day.</u></p> <p><u>(2) The budget building design shall be modeled using cooling temperature setback of 5°F (3°C) lower than the proposed design but not lower than the occupied temperature for not more than 9 hours per day.</u></p> |
| 6. Lighting | |
| <p>Lighting power in the <i>proposed design</i> shall be determined as follows: g. <i>Automatic lighting controls</i> included in the <i>proposed design</i>, but not required by Section 9.4.1 shall be modeled using the following methods for each luminaire under control:</p> <ol style="list-style-type: none"> <i>Manual-ON</i> or <i>partial-auto-ON</i> occupancy sensors shall be modeled by reducing the lighting schedule each hour by the occupancy sensor reduction factors in Table G3.7 for the applicable <i>space</i> type multiplied by 0.25. | |

2. *Automatic lighting controls* listed in Table 9.6.3 shall be modeled using the sum of the applicable control factors (CF). Apply control factors (CF) to only the portion of wattage of the fixtures in the space controlled by said lighting control. Divide each hour of the lighting schedule by $(1 + \Sigma CF)$, where ΣCF indicates the sum of all applicable control factors for that space per Section 9.6.3 and Table 9.6.3.
3. For luminaires that meet requirements in Section 11.5.2.5.2 “L02 Continuous Dimming and High-End Trim,” the lighting schedule each hour shall be reduced by 7.5% compared to the budget building design.
4. For lighting in dwelling units with controls meeting requirements in Section 11.5.2.5.5 “L05 Lighting Control for Multifamily Buildings,” the lighting schedule each hour shall be reduced by 10%.

Table G3.1 Modeling Requirements for Calculating Proposed and Baseline Building Performance

| No. | Proposed Building Performance | Baseline Building Performance |
|-------|--|--|
| 4. | Schedule | Same as proposed design. |
| | Schedules capable of modeling hourly variations in occupancy, lighting power, miscellaneous <i>equipment</i> power, <i>thermostat set points</i> , and <i>HVAC system</i> operation shall be used. The schedules shall be typical of the proposed <i>building</i> type as determined by the designer and approved by the <i>rating authority</i> . | <p>Exceptions</p> <ol style="list-style-type: none"> 1. <i>Set points</i> and schedules for <i>HVAC systems</i> that <i>automatically</i> provide occupant thermal comfort via means other than directly controlling the air dry-bulb and wet-bulb temperature may be allowed to differ, provided that equivalent levels of occupant thermal comfort are demonstrated via the methodology in ASHRAE Standard 55, Section 5.3.3, “Elevated Air Speed,” or Standard 55, Appendix B, “Computer Program for Calculation of PMV-PPD.” 2. <u>When the proposed building design includes HVAC systems serving dwelling units or sleeping units that have controls meeting requirements of Section 11.5.2.2.4 “H04: Residential Space HVAC Control”:</u> <ol style="list-style-type: none"> (i) <u>The budget building design shall be modeled using heating temperature setback of 5°F (3°C) higher than in the proposed design but not higher than the occupied temperature for a maximum of 9 hours per day.</u> (ii) <u>The budget building design shall be modeled using cooling temperature setback of 5°F (3°C) lower than the proposed design but not lower than the occupied temperature for not more than 9 hours per day.</u> |
| | | <ol style="list-style-type: none"> 2. 3 Schedules may be allowed to differ between <i>proposed design</i> and <i>baseline building design</i> when necessary to model nonstandard <i>efficiency</i> measures, provided that the revised schedules have been approved by the <i>rating authority</i>. Measures that may warrant use of different schedules include but are not limited to <i>automatic lighting controls</i>, <i>automatic natural ventilation controls</i>, <i>automatic demand control ventilation controls</i>, and <i>automatic controls</i> that reduce <i>service water-heating</i> loads. In no case shall schedules differ where the <i>controls</i> are <i>manual</i> (e.g., <i>manual</i> operation of light switches or <i>manual</i> operation of windows). 3.4 Fan schedules may be allowed to differ when <u>Section G3.1.1(c)</u> applies. 5. <u>Lighting schedules may be allowed to differ based on <i>occupancy sensor</i> reduction factor in Tables G3.7-1 and G3.7-2</u> |

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Table G3.7-1 Performance Rating Method Lighting Power Density Allowances and Occupancy sensor Reductions Using the Space-by-Space Method

| Common Space Types ^a | Lighting Power Density, W/ft ² (W/m ²) | Occupancy sensor Reduction ^{b,d,e} |
|---------------------------------|--|---|
|---------------------------------|--|---|

<<CONTENT REMAINS THE SAME>>

- a. In cases where both a common *space* type and a *building* area specific *space* type are listed, the *building* area specific *space* type shall apply
- b. For *manual-ON* or *partial-auto-ON* *occupancy sensors*, the *occupancy sensor* reduction factor shall be multiplied by 1.25.
- c. For *occupancy sensors* controlling individual workstation lighting, *occupancy sensor* reduction factor shall be 30%.
- d. For *luminaires* that meet requirements in Section 11.5.2.5.2 “L02 Continuous Dimming and High-End Trim”, the *occupancy sensor* reduction factor shall be increased by 7.5%.
- e. For lighting in *dwelling units* with controls meeting requirements in Section 11.5.2.5.5 “L05 Lighting Control for Multifamily Buildings” the *occupancy sensor* reduction factor shall be 10%.

Table G3.7-2 Performance Rating Method Lighting Power Density Allowances and Occupancy sensor Reductions Using the Space-by-Space Method

| Building-Specific Space Types ^a | Lighting Power Density, W/ft ² (W/m ²) | Occupancy sensor Reduction ^{b,d,e} |
|--|--|---|
|--|--|---|

<<CONTENT REMAINS THE SAME>>

- a. In cases where both a common *space* type and a *building* area specific *space* type are listed, the *building* area specific *space* type shall apply
- b. For *manual-ON* or *partial-auto-ON* *occupancy sensors*, the *occupancy sensor* reduction factor shall be multiplied by 1.25.
- c. For *occupancy sensors* controlling individual workstation lighting, *occupancy sensor* reduction factor shall be 30%.
- d. For *luminaires* that meet requirements in Section 11.5.2.5.2 “L02 Continuous Dimming and High-End Trim”, the *occupancy sensor* reduction factor shall be increased by 7.5%.
- e. For lighting in *dwelling units* with controls meeting requirements in Section 11.5.2.5.5 “L05 Lighting Control for Multifamily Buildings” the *occupancy sensor* reduction factor shall be 10%.