



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

Public Review Draft

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

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

This draft has been recommended for public review by the responsible project committee. To submit a comment on this proposed standard, go to the ASHRAE website at www.ashrae.org/standards-research--technology/public-review-drafts and access the online comment database. The draft is subject to modification until it is approved for publication by the Board of Directors and ANSI. Until this time, the current edition of the standard (as modified by any published addenda on the ASHRAE website) remains in effect. The current edition of any standard may be purchased from the ASHRAE Online Store at www.ashrae.org/bookstore or by calling 404-636-8400 or 1-800-727-4723 (for orders in the U.S. or Canada).

This standard is under continuous maintenance. To propose a change to the current standard, use the change submittal form available on the ASHRAE website, www.ashrae.org.

The appearance of any technical data or editorial material in this public review document does not constitute endorsement, warranty, or guaranty by ASHARE of any product, service, process, procedure, or design, and ASHRAE expressly disclaims such.

© 2019 ASHRAE. This draft is covered under ASHRAE copyright. Permission to reproduce or redistribute all or any part of this document must be obtained from the ASHRAE Manager of Standards, 1791 Tullie Circle, NE, Atlanta, GA 30329. Phone: 404-636-8400, Ext. 1125. Fax: 404-321-5478. E-mail: standards.section@ashrae.org.

ASHRAE, 1791 Tullie Circle, NE, Atlanta GA 30329-2305

© 2019 ASHRAE

This draft is covered under ASHRAE copyright. The appearance of any technical data or editorial material in this publication document does not constitute endorsement, warranty, or guaranty by ASHRAE of any product, service, process, procedure, design or the like and ASHRAE expressly disclaims such. Permission to republish or redistribute must be obtained from the MOS.

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

The addendum clarifies how to establish the Appendix G baseline space conditioning categories that must be used in conjunction with Tables G3.4-1 to G3.4-8.

Currently, the baseline space conditioning categories are the same as in the proposed design and are based on the definition of “space” in Section 3. As a result, if a conditioned space is designed to be low energy, the baseline for that space would end up being modeled based on the semi-heated space envelope requirements rather than the more appropriate conditioned space envelope requirements.

In addition, the space conditioning categories in Section 3 have changed since 2004 (e.g. cooling space threshold has changed from 5 Btu/hr-sf to 3.4 Btu/hr-sf) and may change again in future editions of 90.1. Thus, using Section 3 to establish Appendix G baseline space conditioning categories conflicts with the intent to keep Appendix G baseline unchanged from edition to edition.

The addendum incorporates the thresholds from 90.1 2004 into Appendix G, so that the baseline envelope is not affected by the updates to Section 3. Additionally, it clarifies that heating and cooling loads used to establish baseline space conditioning category are determined by the baseline sizing runs.

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

Addendum DB to 90.1-2016

Revise the Standard as follows (IP Units)

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

No.	Proposed Building Performance	Baseline Building Performance
5.	<i>Building Envelope</i>	Equivalent dimensions shall be assumed for each <i>building envelope</i> component type as in the <i>proposed design</i> ; i.e., the total gross area of <i>walls</i> shall be the same in the <i>proposed</i>

<p>a. All components of the <i>building envelope</i> in the <i>proposed design</i> shall be modeled as shown on architectural drawings or as built for <i>existing building envelopes</i>.</p> <p>...</p>	<p><i>design</i> and <i>baseline building design</i>. The same shall be true for the areas of roofs, floors, and doors, and the exposed perimeters of concrete slabs on <i>grade</i> shall also be the same in the <i>proposed design</i> and <i>baseline building design</i>. The following additional requirements shall apply to the modeling of the <i>baseline building design</i>:</p> <p>a. ...</p> <p><u>b. Space Conditioning Categories.</u> <i>Space conditioning categories</i> used to determine applicability of the envelope requirements in Tables G3.4-1 to G3.4-8 shall be the same as in the proposed design.</p> <p><u>Exception:</u> Envelope components, of the HVAC zones that are semi-heated in the proposed design, must meet conditioned envelope requirements in Tables G3.4-1 to G3.4-8 if, based on the sizing runs, these zones are served by a baseline system with sensible cooling output capacity ≥ 5 Btu/h·ft² (15 W/m²) of floor area, or with heating output capacity greater than or equal to the criteria in Table G3.4-9, or that are <i>indirectly conditioned spaces</i>.</p> <p><u>b.c.</u> ... {reletter subsequent subsections. remainder of section remains unchanged}</p>
---	--

Table G3.4-9 Heated Space Criteria

<u>Climate Zone</u>	<u>Heating Output, Btu/h-ft2 (W/m2)</u>
<u>0, 1, 2</u>	<u>>5 (15)</u>
<u>3</u>	<u>>10 (30)</u>
<u>4, 5</u>	<u>>15 (45)</u>
<u>6,7</u>	<u>>20 (60)</u>
<u>8</u>	<u>>25 (75)</u>

=====

Section G3.1 Part 5 has been previously modified by addendum m and addendum ac, which have been approved for publication and addendum av which has not yet been approved for publication. If this proposal and addendum av are approved for publication, the section will appear as follows. Text that did not appear in addendum m, addendum ac, and addendum av or in the previous sections of this draft, are shown below in strikethrough/underline:

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

No.	Proposed <i>Building Performance</i>	<i>Baseline Building Performance</i>
.....		
5.	<i>Building Envelope</i>	

- a. All components of the *building envelope* in the *proposed design* shall be modeled as shown on architectural drawings or as built for *existing building envelopes*.

...

Equivalent dimensions shall be assumed for each *building envelope* component type as in the *proposed design*; i.e., the total gross area of *walls* shall be the same in the *proposed design* and *baseline building design*. The same shall be true for the areas of *roofs*, *floors*, and *doors*, and the exposed perimeters of concrete slabs on *grade* shall also be the same in the *proposed design* and *baseline building design*. The following additional requirements shall apply to the modeling of the *baseline building design*:

- a. **Orientation.** The *baseline building performance* shall be generated by simulating the *building* with its actual *orientation* and again after rotating the entire *building* 90, 180, and 270 degrees, then averaging the results. The *building* shall be modeled so that it does not shade itself.

Exceptions:

1. If it can be demonstrated to the satisfaction of the *rating authority* that the *building orientation* is dictated by site considerations.
2. *Buildings* where the *vertical fenestration area* on each *orientation* varies by less than 5%.

- b. **Space Conditioning Categories.** *Space conditioning categories* used to determine applicability of the envelope requirements in Tables G3.4-1 to G3.4-8 shall be the same as in the *proposed design*.

Exception: Envelope components, of the HVAC zones that are semi-heated in the *proposed design*, must meet conditioned envelope requirements in Tables G3.4-1 to G3.4-8 if, based on the sizing runs, these zones are served by a baseline system with sensible cooling output capacity $>5 \text{ Btu/h}\cdot\text{ft}^2$ ($>15 \text{ W/m}^2$) of floor area, or with heating output capacity greater than or equal to the criteria in Table G3.4-9, or that are *indirectly conditioned spaces*.

- c. **Opaque Assemblies.** *Opaque assemblies* used for new *buildings*, *existing buildings*, or additions shall conform with assemblies detailed in [Appendix A](#) and shall match the appropriate assembly maximum *U-factors* in Tables [G3.4-1](#) through [G3.4-8](#):

- *Roofs*—Insulation entirely above deck ([A2.2](#)).
- *Above-grade walls*—Steel-framed ([A3.3](#)).
- *Below-grade walls*—Concrete block ([A4](#)).
- *Floors*—Steel-joist ([A5.3](#)).
- *Slab-on-grade floors* shall match the *F-factor* for unheated slabs from the same tables ([A6](#)).
- *Opaque door types* shall be of the same type of *construction* as the *proposed design* and conform to the *U-factor* requirements from the same tables ([A7](#)).

- d. **Vertical Fenestration Areas.** For *building area types* included in Table [G3.1.1-1](#), *vertical fenestration areas* for new *buildings* and additions shall equal that in Table [G3.1.1-1](#) based on the area of gross *above-grade walls* that separate *conditioned spaces* and *semiheated spaces* from the exterior. Where a *building* has multiple *building area types*, each type shall use the values in the table. The *vertical fenestration* shall be distributed on each face of the *building* in the same proportion as in the *proposed design*. For *building areas* not shown in Table [G3.1.1-1](#), *vertical fenestration areas* for new *buildings* and additions shall

equal that in the *proposed design* or 40% of gross *above-grade wall* area, whichever is smaller, and shall be distributed on each face of the *building* in the same proportions in the *proposed design*. The *fenestration area* for an *existing building* shall equal the existing *fenestration area* prior to the proposed work and shall be distributed on each face of the *building* in the same proportions as the *existing building*.

e. **Vertical Fenestration Assemblies.** *Fenestration* for new *buildings*, *existing buildings*, and additions shall comply with the following:

- *Fenestration U-factors* shall match the appropriate requirements in Tables G3.4-1 through G3.4-8 for the applicable glazing percentage for U_{all} .
- *Fenestration SHGCs* shall match the appropriate requirements in Tables G3.4-1 through G3.4-8 using the value for $SHGC_{all}$ for the applicable vertical glazing percentage.
- All *vertical fenestration* shall be assumed to be flush with the *exterior wall*, and no shading projections shall be modeled.
- *Manual window shading devices* such as blinds or shades are not required to be modeled.

f. **Skylights and Glazed Smoke Vents.** *Skylight area* shall be equal to that in the *proposed design* or 3%, whichever is smaller. If the *skylight area* of the *proposed design* is greater than 3%, baseline *skylight area* shall be decreased by an identical percentage in all *roof* components in which *skylights* are located to reach 3%. *Skylight orientation* and tilt shall be the same as in the *proposed design*. *Skylight U-factor* and *SHGC* properties shall match the appropriate requirements in Tables G3.4-1 through G3.4-8 using the value and the applicable *skylight* percentage.

g. **Roof Solar Reflectance and Thermal Emittance.** The exterior *roof* surfaces shall be modeled using a solar *reflectance* of 0.30 and a thermal *emittance* of 0.90.

h. **Roof Albedo.** All *roof* surfaces shall be modeled with a reflectivity of 0.30.

i. The air leakage rate of the *building envelope* ($175Pa$) at a fixed *building* pressure differential of 0.3 in. (75 Pa) of water shall be 1.0 cfm/ft² (5.1 L/s-m²).

j. Where *linear thermal bridges* and *point thermal bridges* as identified in Section 5.5.5.1 through 5.5.5.5 are modeled in the *proposed design*, they shall be represented as modified *U-factors* by adjusting the *U-factor* in accordance with the default values in Appendix A10. If the proposed design does not have *linear thermal bridges* and *point thermal bridges*, as identified in Section 5.5.5.1 through 5.5.5.5, they shall not be modeled in the *budget building design*.

If the balcony length in the proposed design exceeds the maximum allowed by Section 5.5.5.2, Exception 2(c)(i), the area shall be reduced proportionally for each balcony until the limit set in Section 5.5.5.2, Exception 2(c)(i) is met.

Table G3.4-9 Heated Space Criteria

BSR/ASHRAE/IES Addendum DB to ANSI/ASHRAE Standard 90.1-2016, *Energy Standard for Buildings Except Low-Rise Residential Buildings*
First Public Review Draft

Climate Zone	Heating Output, Btu/h·ft ² (W/m ²)
0, 1, 2	>5 (15)
3	>10 (30)
4, 5	>15 (45)
6,7	>20 (60)
8	>25 (75)