BSR/ASHRAE/IES Addendum DA
to ANSI/ASHRAE/IES Standard 90.1-2016

Public Review Draft

Proposed Addendum DA 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)

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FOREWORD

The proposed addendum aligns documentation (G1.3.2) simulation program (G2.2) climatic data (G2.3) and exceptional calculations (G2.5) requirements of Appendix G with the corresponding requirements of Section 11. In addition, the language of Section G2.4.2 is updated to take into account that the current version of Appendix G prescribes the baseline service water heating and space heating energy source. This proposed addendum has no impact on cost effectiveness.

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 DA to 90.1-2016

Revise the Standard as follows (IP Units)

G1.3 Documentation Requirements

~~Simulated performance shall be documented, and documentation shall be submitted to the *rating authority*. The information shall be submitted in a report and shall include the following:~~ The following documentation shall be submitted to the *rating authority:*

a. ~~A brief description of the project, the key *energy efficiency* improvements compared with the requirements in Sections 5 through 10, t~~The *simulation program* used, the version of the *simulation program*, and the results of the *energy* analysis including~~. This summary shall contain~~ the calculated values for the baseline building unregulated energy cost (BBUEC), baseline building regulated energy cost (BBREC), Building Performance Factor (BPF), *baseline building performance*, the *proposed building performance*~~, and the percentage improvement~~ Performance Cost Index (PCI), and Performance Cost Index Target (PCIt).

b. An overview of the project that includes the number of stories (above and below *grade*), the typical *floor* size, the uses in the *building* (e.g., office, cafeteria, retail, parking, etc.), the gross area of each use, and whether each use is *conditioned space*.

c. A list of the *energy*-related features that are included in the design and on which the performance rating is based. This list shall document all *energy* features that differ between the models used in the *baseline building performance* and *proposed building performance* calculations.

d. A list showing compliance for the *proposed design* with all the requirements of Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4 (mandatory provisions).

e. A list identifying those aspects of the *proposed design* that are less stringent than the requirements of 5.5, 6.5, 7.5,9.5, and 9.6 (prescriptive provisions).

f. A list identifying those aspects of the *proposed design* that are more stringent than the requirements of Sections 5 through 10.

~~f~~ g. A table with a summary by end use of the ~~*energy* cost savings in the~~ *proposed building performance*~~.~~ and *baseline building performance*, with each end use separated into regulated and unregulated components.

~~g~~. h. A site plan showing all adjacent *buildings* and topography that may shade the proposed *building* (with estimated height or number of stories).

~~h.~~ i. *Building* elevations and *floor* plans ~~(schematic is acceptable)~~.
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G2.2 Simulation Program
The *simulation program* shall be a computer-based program for the analysis of *energy* consumption in *buildings* ~~(a program such as, but not limited to, DOE-2, BLAST, or EnergyPlus). The *simulation program* shall include calculation methodologies for the *building* components being modeled.~~ For components that cannot be modeled by the *simulation program*, the exceptional calculation methods requirements in Section G2.5 shall be used.

> **Informative Note**
> The simulation program should implement the rules of Appendix G that controls simulation inputs and outputs be adopted for the purposes of easier use and simpler compliance.

G2.2.2
The *simulation program* shall have the ability to either directly determine the *proposed building performance* and *baseline building performance* or produce hourly reports of *energy* use by an *energy* source suitable for determining the *proposed building performance* and *baseline building performance* using a separate calculation ~~engine.~~

G2.2.3
The *simulation program* shall be capable of performing design load calculations to determine required HVAC *equipment* capacities and air and water flow rates in accordance with ~~*generally accepted engineering standards* and handbooks (for example, *ASHRAE Handbook—Fundamentals*)~~ Section 6.4.2 for both the *proposed design* and *baseline building design*.

G2.3 Climatic Data
The *simulation program* shall perform the simulation using hourly values of climatic data, ~~such as~~ including temperature, ~~and~~ humidity, solar radiation, and wind speed and direction from representative climatic data, for the site in which the *proposed design* is to be located. ~~For cities or urban regions with several climatic data entries~~, For locations for which several climatic data sources are available or ~~and for locations where~~ weather data ~~are~~ is not available, the designer shall select available weather data that best represent the climate at the *construction* site. The selected weather data shall be approved by the *rating authority*.

G2.4.2 Annual Energy Costs
The *design energy cost* and baseline *energy* cost shall be determined using either actual rates for *purchased energy* or state average *energy* prices published by DOE's Energy Information Administration (EIA) for commercial *building* customers, but rates from different sources may not be mixed in the same project. Where *on-site renewable energy* or *site-recovered energy* is used, the *baseline building design* shall be based on the *energy* source used as the backup *energy* source, or the baseline *system energy* source in that category if no backup *energy* source has been specified~~.~~, except where the baseline energy source is prescribed in Tables G3.1.1-2 and G3.1.1-3.

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G2.5 Exceptional Calculation Methods

When the *simulation program* does not model a design, material, or device of the *proposed design*, an exceptional calculation method shall be used as approved by the *rating authority*. Where there are multiple designs, materials, or devices that the *simulation program* does not model, each shall be calculated separately and exceptional savings determined for each. At no time shall the total exceptional savings constitute more than half of the difference between the *baseline building performance* and the *proposed building performance*. All applications for approval of an exceptional method shall include the following:

a. Theoretical and empirical information verifying the method's accuracy, and ~~S~~step-by-step documentation of the exceptional calculation method performed, detailed enough to reproduce the results.

b. Copies of all spreadsheets used to perform the calculations.

c. A sensitivity analysis of *energy* consumption when each of the input parameters that are estimated is varied from half to double the value assumed.

d. The calculations shall be performed on a time-step basis consistent with the *simulation program* used.

e. The ~~performance rating~~ Performance Cost Index calculated with and without the exceptional calculation method.

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

No.	Proposed *Building* Performance	*Baseline Building* Performance
4. Schedule		
……..		1.
	HVAC Fan Schedules. Schedules for HVAC fans that provide *outdoor air* for *ventilation* shall run continuously whenever *spaces* are occupied and shall be cycled ON and OFF to meet heating and cooling loads during unoccupied hours.	
	Exceptions:	
	……	
	4. Dedicated outdoor air supply fans shall stay off during unoccupied hours.	

Note to Reviewer: Multiple Addenda currently modify sections of the Appendix G.

Addendum o modifies the language in Section G1.3. Addendum cp also modifies the language is Section G2.2. Addendum bk also modifies the language in Section G2.4.2 If these addenda are published then these sections will appear as follows. Text that did not appear in these addenda or in the previous sections of this draft, are shown below in strikethrough/underline:

G1.3 Submittals

G1.3.1 General

Compliance documentation and supplemental information shall be submitted in accordance with Section 4.2.2 of this standard.

G1.3.2 Application Documentation

The following documentation shall be submitted to the *rating authority:*
a. The *simulation program* used, the version of the *simulation program*, and the results of the *energy* analysis including the calculated values for the baseline building unregulated energy cost (BBUEC), baseline building regulated energy cost (BBREC), Building Performance Factor (BPF), *baseline building performance*, the *proposed building performance* Performance Cost Index (PCI), and Performance Cost Index Target (PCIt).
b. An overview of the project that includes the number of stories (above and below *grade*), the typical *floor* size, the uses in the *building* (e.g., office, cafeteria, retail, parking, etc.), the gross area of each use, and whether each use is *conditioned space*.
c. A list of the *energy*-related features that are included in the design and on which the performance rating is based. This list shall document all *energy* features that differ between the models used in the *baseline building performance* and *proposed building performance* calculations.
d. A list showing compliance for the *proposed design* with all the requirements of Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4 (mandatory provisions).
e. A list identifying those aspects of the *proposed design* that are less stringent than the requirements of 5.5, 6.5, 7.5,9.5, and 9.6 (prescriptive provisions).
f. A list identifying those aspects of the *proposed design* that are more stringent than the requirements of Sections 5 through 10.
g. A table with a summary by end use of the *proposed building performance* and *baseline building performance*, with each end use separated into regulated and unregulated components.
h. A site plan showing all adjacent *buildings* and topography that may shade the proposed *building* (with estimated height or number of stories).
i. *Building* elevations and *floor* plans.
…….

G2.2 Simulation Program

The *simulation program* shall be a computer-based program for the analysis of *energy* consumption in *buildings.* For components that cannot be modeled by the *simulation program*, the exceptional calculation methods requirements in Section G2.5 shall be used.

Exception:

When approved by the *adopting authority*, a separate computer-based program shall be permitted to be used to calculate *on-site renewable energy*.

Informative Note

ASHRAE Standing Standard Project Committee 90.1 recommends that the simulation program implements the rules of Appendix G that controls simulation inputs and outputs be adopted for the purposes of easier use and simpler compliance.

G2.4.2 Annual Energy Costs

The *design energy cost* and baseline *energy* cost shall be determined using either actual rates for *purchased energy* or state average *energy* prices published by DOE's Energy Information Administration (EIA) for commercial *building* customers, but rates from different sources may not be mixed in the same project. Where *on-site renewable energy* or *site-recovered energy* is used, the *baseline building design* shall be based on the *energy* source used as the backup *energy* source, or the baseline *system energy* source in that category if no backup *energy* source has been specified, except where the baseline energy source is prescribed in Tables G3.1.1-2 and G3.1.1-3. Where the proposed design includes *on-site electricity generation systems* other than *on-site renewable energy systems*, the baseline design shall include the same generation systems excluding its *site-recovered energy*.

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G2.5 Exceptional Calculation Methods

When the *simulation program* does not model a design, material, or device of the *proposed design*, an exceptional calculation method shall be used as approved by the *rating authority*. Where there are multiple designs, materials, or devices that the *simulation program* does not model, each shall be calculated separately and exceptional savings determined for each. At no time shall the total exceptional savings constitute more than half of the difference between the *baseline building performance* and the *proposed building performance*. All applications for approval of an exceptional method shall include the following:

a. Theoretical and empirical information verifying the method's accuracy, and step-by-step documentation of the exceptional calculation method performed, detailed enough to reproduce the results.

b. Copies of all spreadsheets used to perform the calculations.

c. A sensitivity analysis of *energy* consumption when each of the input parameters that is estimated is varied from half to double the value assumed.

d. The calculations shall be performed on a time-step basis consistent with the *simulation program* used.

e. The Performance Cost Index calculated with and without the exceptional calculation method.

……

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

No.	Proposed *Building* Performance	*Baseline Building* Performance
4. Schedule …….. **HVAC Fan Schedules.** Schedules for HVAC fans that provide *outdoor air* for *ventilation* shall run continuously whenever *spaces* are occupied and shall be cycled ON and OFF to meet heating and cooling loads during unoccupied hours. **Exceptions:** …… 4. Dedicated outdoor air supply fans shall stay off during unoccupied hours.		2.