

ADDENDA

**ANSI/ASHRAE/IES Addendum da to
ANSI/ASHRAE/IES Standard 90.1-2019**

Energy Standard for Buildings Except Low-Rise Residential Buildings

Approved by ASHRAE and the American National Standards Institute on December 30, 2020, and by the Illuminating Engineering Society on December 16, 2020.

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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FOREWORD

Addendum da aligns documentation (Section G1.3.2), simulation program (Section G2.2), climatic data (Section G2.3), and exceptional calculation (Section 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 addendum has no impact on cost effectiveness.

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

Addendum da to Standard 90.1-2019

Modify Section G1.3.2 as shown (I-P and SI units).

G1.3.2 Application Documentation. ~~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, 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, proposed building performance, and the percentage improvement.~~ Performance Cost Index (PCI), and Performance Cost Index Target (PCI_T).
- 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.
- fg. 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.
- gh. A site plan showing all adjacent buildings and topography that may shade the proposed building (with estimated height or number of stories).
- hi. Building elevations and floor plans (schematic is acceptable).

[. . .]

Modify Section G2 as shown (I-P and SI units).

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.~~

Exception to G2.2: 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: For the ease of use and consistent application, the *simulation program* should automatically implement the requirements of this appendix to generate the baseline design and *proposed design* models based on the user model of the *proposed design*.

[. . .]

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 6.4.2.1 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~~ 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 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.~~

[. . .]

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 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.

[. . .]

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

No.	Proposed Building Performance	Baseline Building Performance
[...]		
4. Schedule		
	<p>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> <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. HVAC fans shall remain on during occupied and unoccupied hours in <i>systems</i> primarily serving <i>computer rooms</i>. <u>Dedicated outdoor air supply fans shall stay off during unoccupied hours.</u> 	<p>Same as proposed design.</p> <p>Exceptions:</p> <ol style="list-style-type: none"> <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." 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</i> lighting controls, <i>automatic</i> natural <i>ventilation controls</i>, <i>automatic demand control ventilation controls</i>, and <i>automatic controls</i> that reduce <i>service water-heating loads</i>. 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). Fan schedules may be allowed to differ when Section G3.1.1(c) applies.
[...]		

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

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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