

ADDENDA

**ANSI/ASHRAE/IES Addendum ab 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 June 30, 2021, and by the Illuminating Engineering Society on June 9, 2021.

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 ab changes to the wording of Section G3.1.1 to clarify the process of selecting baseline HVAC systems when using Appendix G Performance Rating Method (PRM). The following clarifications are made.

- a. *All residential spaces, regardless of size, in any building shall be modeled with a baseline system Type 1 or 2, depending on climate zone.*
- b. *Certain nonresidential spaces, such as corridors, storage rooms, restrooms, or a small lounge or office, that are designed to primarily serve the residents of a building and are located on a floor where the majority of the gross floor area of the floor is residential space types are to be modeled as system Types 3 and 4. A new definition, residential associated HVAC zones, is added to clarify these unique spaces and to help streamline the selection of baseline HVAC systems.*
- c. *The changes clarify how baseline HVAC systems shall be selected.*
 1. *First, the combined floor area of conditioned and semiheated floors is determined for the building area types used to determine baseline HVAC systems.*
 2. *Second, the nonresidential building area type with the largest floor area calculated in Step 1 is classified as the predominant nonresidential building area type. Any building area type with less than 20,000 ft² from Step 1 is considered part of the predominant nonresidential building area type.*
 3. *Assign baseline HVAC system types for the residential building area type, the predominant building area type, and any other nonresidential building area types with more than 20,000 ft² from Step 1.*
 4. *Once baseline HVAC systems are determined, they shall be added or altered for individual HVAC zones based on certain criteria. Criteria related to HVAC zones' specific baseline system changes were put in a new Section G3.1.1.2.*
 5. *Section G3.1.1.3 was added to clarify how to assign different baseline HVAC system types within the baseline building design.*
- d. *The notes to Table G3.1.1-3 were all deleted and incorporated into Section G3.1.1.1(a).*
- e. *The requirements for hospitals were moved from Section G3.1.1.2 to Table G3.1.1-3 as a building area type. This clarifies the current intent of G3.1.1(h).*
- f. *G3.1.1(g) was renumbered G3.1.1.2(e), and the language was revised to clarify selecting baseline HVAC system types for computer rooms.*
- g. *Table G3.1.1-3 was revised to clarify the current intent. None of the clarifications change the intent of the current requirements.*
- h. *Several editorial changes were made to provide consistent application of the term "HVAC zone" as an alternative to "space," "zone," or "thermal zone," which have been historically used throughout Appendix G.*

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: 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 ab to Standard 90.1-2019

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

residential associated HVAC zone: any HVAC zone that primarily includes nonresidential spaces designed to serve occupants of residential spaces, including but not limited to corridors, stairwells, elevator lobbies, and common restrooms, on a floor where over 75% of the gross conditioned floor area are residential spaces. This definition does not apply to HVAC zones within hospitals.

Modify Section 3.3 as shown (I-P and SI units).

<u>CV</u>	<u>constant volume</u>
[...]	
<u>ER</u>	<u>energy recovery</u>
[...]	
<u>HW</u>	<u>heating hot water</u>
[...]	
<u>PFP</u>	<u>parallel fan-powered</u>
[...]	
<u>PSZ-AC</u>	<u>packaged single-zone air conditioner</u>
<u>PSZ-HP</u>	<u>packaged single-zone heat pump</u>
[...]	
<u>SZ</u>	<u>single zone</u>

Modify Appendix G as shown (I-P and SI units). Renumber current Sections G3.1.1.1 through G3.1.1.4.

G3. CALCULATION OF THE PROPOSED DESIGN AND BASELINE BUILDING PERFORMANCE

G3.1 Building Performance Calculations. The simulation model for calculating the proposed and *baseline building performance* shall be developed in accordance with the requirements in Table G3.1.

G3.1.1 Baseline HVAC System Type and Description. *HVAC systems in the baseline building design* shall comply with the following:

- a. *HVAC systems in the baseline building design* shall be determined in the following order of priority:
 1. The *building type* with the largest *conditioned floor area*.
 2. Number of *floors* (including *floors* above grade and below grade but not including *floors* solely devoted to parking).
 3. *Conditioned gross floor area*.
 4. Climate zone as specified in Table G3.1.1.3, which shall conform with the *system descriptions* in Table G3.1.1.4. For *Systems* 1, 2, 3, 4, 9, 10, 11, 12, and 13, each *thermal block* shall be modeled with its own *HVAC system*. For *Systems* 5, 6, 7, and 8, each *floor* shall be modeled with a separate *HVAC system*. *Floors* with identical *thermal blocks* can be grouped for modeling purposes.
- b. Use additional system types for nonpredominant conditions (i.e., residential/nonresidential or heating source) if those conditions apply to more than 20,000 ft² (1900 m²) of conditioned floor area.

HVAC systems in the baseline building design shall be selected based on the *building area types* and criteria described in Section G3.1.1.1 and shall be adjusted, when applicable, based on the requirements in Section G3.1.1.2 and modeled in the *baseline building design* per Section G3.1.1.3.

G3.1.1.1 Baseline HVAC System Types based on Building Area Types. *HVAC system types in the baseline building design* shall be determined as follows:

- a. Determine the combined area of the *gross conditioned floor area* and *semiheated floor area* of each of the following *building area types* in the *proposed design*:
 1. **Residential.** *HVAC zones* that include *dwelling units*, guest rooms, living quarters, private living spaces, and sleeping quarters, and *residential associated HVAC zones* shall be classified as residential. Other space types, including patient rooms in hospitals, shall not be classified as residential.

2. **Public Assembly.** Houses of worship, auditoriums, movie theaters, performance theaters, concert halls, arenas, enclosed stadiums, ice rinks, gymnasiums, convention centers, exhibition centers, and natatorium *buildings* shall be classified as public assembly. *HVAC zones* that include these area types in other *buildings* shall also be classified as public assembly.
 3. **Heated-Only Storage.** Nonrefrigerated warehouse buildings and heated parking garages that are not mechanically cooled shall be classified as heated-only storage.
 4. **Retail.** Grocery stores, retail stores, and supermarket *buildings* with two floors or fewer shall be classified as retail.
 5. **Hospitals.** Hospital *building* area types, including patient rooms, shall be classified as hospitals.
 6. **Other Nonresidential.** *Buildings* and areas within *buildings* that are not classified as residential, public assembly, heated-only storage, hospital, or retail shall be classified as other nonresidential.
- b. Classify the *nonresidential building* area type with the largest combined area from Section G3.1.1.1(a) as the predominant *nonresidential building* area type. Add the combined area of any remaining *nonresidential building* area types with less than 20,000 ft² (1900 m²) to the combined area of the predominant *nonresidential building* area type.
- c. Select a baseline *HVAC system* type from Table G3.1.1-3 for each of the following *building* area types included in the *proposed design*:
1. Residential based on G3.1.1.1(a)
 2. Predominant *nonresidential* based on G3.1.1(b)
 3. Each additional *nonresidential building* area type with more than 20,000 ft² (1900 m²) of combined area based on G3.1.1.1(a)

G3.1.1.2 Additional and Adjusted Baseline HVAC System Types. Baseline *HVAC systems* shall be added or adjusted for individual *HVAC zones* based on the following criteria.

- a. ~~e.~~ If the baseline *HVAC system* type is 5, 6, 7, or 8, 9, 10, 11, 12, or 13 use separate *single-zone systems* conforming with the requirements of *system 3* or *system 4* for any *HVAC zones* that have occupancy, internal gains, or schedules that differ significantly from the rest of the *HVAC zones* served by the *system*. The total peak internal gains that differ by 10 Btu/h·ft² (31.2 W/m²) or more from the average of other *HVAC zones* served by the *system*, or schedules that differ by more than 40 equivalent full-load hours per week from other ~~spaces~~ *HVAC zones* served by the *system*, are considered to differ significantly. Examples where this exception may be applicable include but are not limited to natatoriums and continually occupied security areas. This exception does not apply to *computer rooms*.
- b. ~~d.~~ For *Laboratory spaces* In a *building* having a total laboratory exhaust rate greater than 15,000 cfm (7100L/s), use a single *system* of type 5 or 7 serving only those ~~spaces~~ *HVAC zones* that include the laboratory spaces. The lab exhaust fan shall be modeled as constant horsepower (kilowatts) reflecting constant-volume stack discharge with *outdoor air* bypass.
- c. ~~e.~~ *Thermal zones HVAC zones* designed with heating-only *systems* in the *proposed design* serving storage rooms, stairwells, vestibules, electrical/mechanical rooms, and restrooms not exhausting or transferring air from mechanically cooled thermal zones in the *proposed design* shall use *system* type 9 or 10 in the *baseline building design*.
- d. ~~f.~~ If the baseline *HVAC system* type is 9 or 10, use additional *system* types for all *HVAC zones* that are mechanically cooled in the *proposed design*. The baseline *HVAC system* types for such zones shall be determined based on the *building* area type determined in accordance with Section G3.1.1.1(a) and the requirements of Section G3.1.1.1(c).
- e. ~~g.~~ The baseline *HVAC system* serving *HVAC zones* that include ~~computer rooms~~ shall be modeled in accordance with one of the following:
1. Baseline *System 11* shall be used for such *HVAC zones* in *buildings* with a total *computer room* peak cooling load ~~>greater than 3,000,000 Btu/h (880 kW)~~.
 2. Baseline *System 11* shall be used for such *HVAC zones* in *buildings* ~~or a total computer room peak cooling load >600,000 Btu/h (175kW)~~ where the baseline *HVAC system* type is 7 or 8 and the total *computer room* peak cooling load is greater than 600,000 Btu/h (175 kW).

Table G3.1.1-3 Baseline HVAC System Types

Building Area Types¹, Number of Floors², and Gross-Conditioned Combined Floor Area³	Climate Zones 3B, 3C, and 4 to 8,	Climate Zones 0 to 3A
<i>Residential</i>	<i>System 1—PTAC</i>	<i>System 2—PTHP</i>
Public assembly area smaller than $\lt; 120,000 \text{ ft}^2 \text{ (11,000 m}^2)$	<i>System 3—PSZ-AC</i>	<i>System 4—PSZ-HP</i>
Public assembly area equal to or larger than $\geq 120,000 \text{ ft}^2 \text{ (11,000 m}^2)$	<i>System 12—SZ-CV-HW</i>	<i>System 13—SZ-CV-ER</i>
Heated-only storage	<i>System 9—Heating and ventilation</i>	<i>System 10—Heating and ventilation</i>
Retail in a building that is 1 or 2 floors or fewer	<i>System 3—PSZ-AC</i>	<i>System 4—PSZ-HP</i>
Hospital that is either • larger than $150,000 \text{ ft}^2 \text{ (14,000 m}^2)$, or • in a building greater than 5 floors.	<i>System 7—VAV with reheat</i>	<i>System 7—VAV with reheat</i>
Hospital—all other	<i>System 5—Packaged VAV with reheat</i>	<i>System 5—Packaged VAV with reheat</i>
Other Nonresidential area that is both • smaller than $25,000 \text{ ft}^2 \text{ (2300 m}^2)$ and • in a building 3 floors or fewer.	<i>System 3—PSZ-AC</i>	<i>System 4—PSZ-HP</i>
Other Nonresidential area that is both • smaller than $25,000 \text{ ft}^2 \text{ (2300 m}^2)$ and • in a building with 4 or 5 floors. and 4 or 5 floors and $\lt; 25,000 \text{ ft}^2 \text{ (2300 m}^2)$ or 5 floors or fewer and $25,000 \text{ ft}^2 \text{ (2300 m}^2)$ to $150,000 \text{ ft}^2 \text{ (14,000 m}^2)$	<i>System 5—Packaged VAV with reheat</i>	<i>System 6—Packaged VAV with PFP boxes</i>
Other nonresidential area that is both • $25,000 \text{ ft}^2 \text{ (2300 m}^2)$ to $150,000 \text{ ft}^2 \text{ (14,000 m}^2)$ and • in a building that is 5 floors or fewer	<i>System 5—Packaged VAV with reheat</i>	<i>System 6—Packaged VAV with PFP boxes</i>
Other Nonresidential area that is either • larger than $150,000 \text{ ft}^2 \text{ (14,000 m}^2)$ or • in a building greater than 5 floors. and more than 5 floors or >$150,000 \text{ ft}^2 \text{ (14,000 m}^2)$	<i>System 7—VAV with reheat</i>	<i>System 8—VAV with PFP boxes</i>

Notes:

1. Residential building types include dormitory, hotel, motel, and multifamily. Residential space types include guest rooms, living quarters, private living space, and sleeping quarters. Other building and space types are considered nonresidential.
2. Where attributes make a building eligible for more than one baseline system type, use the predominant condition to determine the system type for the entire building except as noted in Section G3.1.1.
3. For laboratory spaces in a building having a total laboratory exhaust rate greater than 15,000 cfm (7100 L/s), use a single system of type 5 or 7 serving only those spaces.
4. For hospitals, depending on building type, use System 5 or 7 in all climate zones.
5. Public assembly building types include houses of worship, auditoriums, movie theaters, performance theaters, concert halls, arenas, enclosed stadiums, ice rinks, gymnasiums, convention centers, exhibition centers, and natatoriums.
1. Building area type determined in accordance with G3.1.1.1.
2. The total number of floors in a building, including above-grade and below-grade floors but not including floors solely devoted to parking.
3. Combined gross conditioned floor area and semiheated floor area, of the building area type, based on the requirements of Section G3.1.1.1.

3. Baseline System 3 or 4 shall be used for all other HVAC zones that include computer rooms based on climate zone, shall use System 3 or 4.
- h. For hospitals, depending on building area type use system type 5 or 7 in all climate zones.
- f. Residential associated HVAC zones shall use system type 3 or 4 based on climate zone.

G3.1.1.3 For baseline HVAC systems 1, 2, 3, 4, 9, 10, 11, 12, and 13, each HVAC zone or thermal block shall be modeled with its own HVAC system. For Systems 5, 6, 7, and 8, each floor shall be modeled with a separate HVAC system. Floors with identical HVAC zones or thermal blocks can be grouped for modeling purposes.

Exception to G3.1.1.3: Baseline system 5 or 7 serving laboratory spaces in accordance with Section G3.1.1.3(b).

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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.

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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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