

ADDENDA

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

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ISSN 1041-2336



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FOREWORD

Addendum u updates Section 11 to address the budget HVAC systems economizer requirements and requirements for determining budget HVAC equipment capacities for the purpose of evaluating when prescriptive requirements in Section 6 apply to the energy cost budget when thermal zones are combined as a part of simplifying the energy modeling process.

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

Addendum u to Standard 90.1-2019

Modify Section 11.5.2 as shown (I-P and SI units).

11.5.2 HVAC Systems. The HVAC system type and related performance parameters for the budget building design shall be determined from Figure 11.5.2, the system descriptions in Table 11.5.2-1 and accompanying notes, and the following rules:

- a. **Budget Building Systems Not Listed.** Components and parameters not listed in Figure 11.5.2 and Table 11.5.2-1 or otherwise specifically addressed in this subsection shall be identical to those in the *proposed design*.

Exception to 11.5.2(a): Where there are specific requirements in Sections 6.4 and 6.5, the component *efficiency* in the *budget building design* shall be adjusted to the lowest *efficiency* level allowed by the requirement for that component type.

- b. **Minimum Equipment Efficiency.** All HVAC and *service water-heating equipment* in the *budget building design* shall be modeled at the minimum *efficiency* levels, both part load and full load, in accordance with Sections 6.4 and 7.4 based on the budget system type determined following Section 11.5.2(j) and capacity determined following Section 11.5.2(i). Chillers shall use Path A efficiencies as shown in Table 6.8.1-3.
- c. **Supply Fan Energy in Certain Package Equipment.** Where *efficiency* ratings include supply fan energy, the *efficiency* rating shall be adjusted to remove the supply fan energy. For Budget System Types 3, 4, 6, 8, 9, 10, and 11, calculate the minimum $COP_{nfcooling}$ and $COP_{nfheating}$ using the equation for the applicable performance rating as indicated in Tables 6.8.1-1, ~~6.8.1-2, through 6.8.1-4, and 6.8.1-15.~~ Where multiple HVAC zones are combined into a single thermal block in accordance with Table 11.5.1, the efficiencies for budget System Types 6, 8, and 10 taken from Tables 6.8.1-1 through 6.8.1-4, shall be based on 9,000 Btu/hr-2.6 kW equipment capacity for residential spaces otherwise it shall be based on the capacity of the thermal block divided by the number of HVAC zones. Budget System Types 3, 4, 9, and 11 efficiencies taken from Table 6.8.1-1 through 6.8.1-4 shall be based on the cooling equipment capacity of a single floor when grouping identical floors in accordance with Table 11.5.1. Where a full- and part-load *efficiency* rating is provided in Tables 6.8.1-1, ~~6.8.1-2, through 6.8.1-4, and 6.8.1-15,~~ the full-load equation below shall be used:

[...]

- e. **Economizers.** ~~All b~~ Budget building systems as listed in Table 11.5.2-1 shall have *air economizers* ~~or fluid economizers, the same as in the proposed design,~~ in accordance with Section 6.5.1 and Section 11.5.2(i). The high-limit shutoff shall be in accordance with Table 11.5.2-4.

[...]

- i. **Equipment Capacities.** The equipment capacities for the *budget building design* shall be sized proportionally to the capacities in the *proposed design* based on sizing runs, i.e., the ratio between the capacities used in the annual simulations and the capacities determined by the sizing runs shall be the same for both the *proposed design* and *budget building design*. Where multiple HVAC zones are combined into a single *thermal block* or modeled as identical *thermal blocks* to which multipliers are applied in accordance with Table

11.5.1, the *equipment* capacities for the *budget building design* shall be determined as follows:

1. For budget system Types 8 and 10, *equipment* capacity shall be 9000 Btu/h (2.6 kW).
2. For budget system Types 5, 6, 7, 9, and 11, *equipment* capacity shall be based on the load of the *thermal block* divided by the number of combined *HVAC zones*.
3. For budget system Types 1, 2, 3, and 4, *equipment* capacity shall be based on the total load of all associated *thermal blocks*, including multipliers, divided by the total number of corresponding *HVAC systems* specified in the design documents.

Unmet load hours for the *proposed design* or *baseline building designs* shall not exceed 300 hours (of the 8760 hours simulated) [. . .]

Modify Table 11.5.2-1, Footnote (e) as shown (I-P and SI).

e. [. . .]

~~Except during economizer operation, the~~ The tower shall be controlled to maintain a cooling tower leaving water temperature, where weather permits, per Table 11.5.2-5, floating up to the design leaving water temperature for the cooling tower. *Pump system power* for each pumping system shall be the same as the *proposed design*; if the *proposed design* has no condenser water pumps, the *budget building design* pump power shall be 19 W/gpm (301 kW/1000 L/s) (equal to a pump operating against a 60 ft (18 m) head, 60% combined impeller and motor *efficiency*). Each chiller shall be modeled with separate condenser water and chilled-water pumps interlocked to operate with the associated chiller.

Delete Table 11.5.2-4 as shown (I-P and SI).

Table 11.5.2-4 Economizer High Limit Shutoff

Economizer Type	High Limit Shutoff
Air	Table 6.5.1.1.3
Fluid (integrated)	When its operation will no longer reduce <i>HVAC system energy</i>

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