

ADDENDA

**ANSI/ASHRAE/IES Addendum b to
ANSI/ASHRAE/IES Standard 90.2-2024**

High-Performance Energy Design of Residential Buildings

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FOREWORD

Addendum b includes the following changes to Section 5, “Additions and Alterations”:

- *First, this addendum corrects the prescriptive tables to reflect the currently used metrics for space heating and cooling and water heating equipment. Values have been updated to harmonize with the highest, non-advanced efficiency tier set by the Consortium for Energy Efficiency (CEESM) for residential equipment, so consumers can reap the benefits of energy efficient equipment while also qualifying for utility incentives. In addition, this addendum introduces demand response requirements to the standard via industry-recognized test procedures, which may aid in energy savings and carbon reduction. Table 5-1 (SI) was also corrected to show proper SI units that align with Table 5-1 (I-P).*
- *Second, this addendum adds the “no-additional energy option” that currently available to additions to the “Alterations” section as an alternate compliance path.*
- *Third, it modifies the prescriptive requirements for a substantial energy alteration to remove HVAC and water heating requirements, which enables efficiency trade-offs in the ERI calculation.*

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

Addendum b to Standard 90.2-2024

Modify Section 3.2 as follows

<u>COP_H/COP₂</u>	coefficient of performance—heating
<u>COP_C</u>	coefficient of performance—cooling
<u>SCOP</u>	seasonal coefficient of performance
<u>EER/EER₂</u>	energy efficiency ratio
<u>HSPF/HSPF₂</u>	heating seasonal performance factor
<u>SEER/SEER₂</u>	seasonal energy efficiency ratio
<u>UEF</u>	<i>uniform energy factor</i>

Modify Table 5-1 (I-P) as follows.

Table 5-1 Central Air Conditioner and Heat Pump Specifications (I-P)

Equipment Type	EER SEER2	EER EER2	HSPF HSPF2	COP	COP2 at 5°F^a	Capacity Ratio at 5°F/47°F (%)^b	SCOP	COP_H	Additional Demand Response Requirements	Test Procedure
Central Air Conditioners										
Split	16 17.0	13 12.0							Meets AHRI 1380	AHRI 210/240
Packaged	16	12 11.5							Meets AHRI 1380	AHRI 210/240
Heat Pumps										
Air source: Split rated capacity below 50,000 Btuh (Path A)	16	13 9.8	9.0 8.5		1.75	65			Meets AHRI 1380	AHRI 210/240
Air source: Split rated capacity at or above 50,000 Btuh (Path B)	16	13 11.0	8.5 8.0		1.75	50			Meets AHRI 1380	AHRI 210/240
Air source: Packaged	16 15.2	12 10	8.2 7.2		1.75	45			Meets AHRI 1380	AHRI 210/240
Geothermal closed loop: Water-to-air		17.1		3.6						ISO 13256-1
Geothermal open loop: Water-to-air		21.1		4.1						ISO 13256-1
Geothermal closed loop: Water-to-water		16.1		3.1						ISO 13256-2
Geothermal open loop: Water-to-water		20.1		3.5						ISO 13256-2
Direct geexchange <u>to air</u> (DGX)		16.0		3.6						AHRI 870
<u>Direct geexchange to water</u> (DGX)		15.0		3.1						AHRI 870

a. Equipment shall perform the U.S. Department of Energy Controls Verification Procedure (CVP) where applicable, to confirm that the performance metrics measured at the Appendix M1 low ambient test point at 5°F are achieved by the native controls operating as they would in a residential building. The CVP requirement is inapplicable to equipment within single-speed and two-stage compressors.

b. Heating capacity ratio is calculated as the heating capacity at 5°F to the heating capacity at 47°F, which for variable-capacity systems is the HI_{Nom} heating capacity and for all other systems is the HI_{Full} heating capacity.

Modify Table 5-1 (SI) as follows.

Table 5-1 Central Air Conditioner and Heat Pump Specifications (SI)

Equipment Type	SEER	EER	HSPF SCOP— <u>Colder Climate</u>	COP_H	<u>COP₂ at 8.33°C^a</u>	<u>Capacity Ratio at -15°C/8.33°C (%)^b</u>	SCOP	COP_C	<u>Additional Requirements</u>	<u>Test Procedure</u>
Central Air Conditioners										
Split	16 <u>4.98</u>	13 <u>3.52</u>					3.81		<u>Meets AHRI 1380</u>	<u>EN 14825</u>
Packaged	16 <u>4.69</u>	12 <u>3.37</u>					3.52		<u>Meets AHRI 1380</u>	<u>EN 14825</u>
Heat Pumps										
Air Source: Split rated capacity below 12 <u>14.7</u> kW	16 <u>4.69</u>	13 <u>2.87</u>	9.0 <u>2.49</u>		<u>1.75</u>	<u>65</u>	3.81		<u>Meets AHRI 1380</u>	<u>EN 14825</u>
Air Source: Split rated capacity at or above 12 <u>14.7</u> kW	16 <u>4.69</u>	13 <u>3.22</u>	8.5 <u>2.34</u>		<u>1.75</u>	<u>50</u>			<u>Meets AHRI 1380</u>	<u>EN 14825</u>
Air source: Packaged	16 <u>4.45</u>	12 <u>2.93</u>	8.2 <u>2.11</u>		<u>1.75</u>	<u>45</u>	3.52		<u>Meets AHRI 1380</u>	<u>EN 14825</u>
Geothermal closed loop: Water-to-air		17.1		3.6				5.01		<u>ISO 13256-1</u>
Geothermal open loop: Water-to-air		21.1		4.1				6.18		<u>ISO 13256-1</u>
Geothermal closed loop: Water-to-water		16.1		3.1				4.72		<u>ISO 13256-2</u>
Geothermal open loop: Water-to-water		20.1		3.5				5.89		<u>ISO 13256-2</u>
Direct geexchange to <u>air</u> (DGX)		16		3.6				4.69		<u>AHRI 871</u>
<u>Direct geexchange to water</u> (DGX)				<u>3.1</u>				<u>4.40</u>		<u>AHRI 871</u>

a. Equipment shall perform the U.S. Department of Energy Controls Verification Procedure (CVP) where applicable, to confirm that the performance metrics measured at the Appendix M1 low ambient test point at 5°F are achieved by the native controls operating as they would in a residential building. The CVP requirement is inapplicable to equipment within single-speed and two-stage compressors.

b. Heating capacity ratio is calculated as the heating capacity at -15°C to the heating capacity at 8.33°C, which for variable-capacity systems is the $H1_{Nom}$ heating capacity and for all other systems is the $H1_{Full}$ heating capacity.

Modify Tables 5-2 and 5-3 as follows.

Table 5-2 Gas-Fired Heating Equipment Furnace and Gas Boiler Specifications

Equipment Type	AFUE	COP(47)
Gas-fired furnaces	$\geq 95\%$ $\geq 97\%$	
Gas-fired boilers	$\geq 90\%$ $\geq 95\%$	
Gas-fired heat pump ^a	$\geq 120\%$	≥ 1.2
Gas-fired heat pump boilers ^a	$\geq 120\%$	≥ 1.2

a. Tested to CSA/ANSI Z21.40.4.

Table 5-3 Water Heater Minimum Efficiency

Equipment Type	EFUEF	COP _H
Gas storage water heaters: Medium draw pattern	≥ 0.81	
Gas storage water heaters: High draw pattern	≥ 0.86	
Gas tankless water heaters	≥ 0.95 with electronic ignitions	
Electric storage water heaters (integrated) (≥ 55 gal [210 L])	≥ 3.3 and meets AHRI 1430 ^a	
Electric storage water heaters (> 55 gal [210 L])	≥ 2.2 and meets AHRI 1430	
Electric storage water heaters (Split Systems)	≥ 2.2 and meets AHRI 1430 ^a	
Commercial heat pump water heaters		≥ 3.0

a. AHRI 1430 is only applicable to water heaters with a nominal storage capacity greater than or equal to 40 gallons and less than or equal to 120 gallons.

Modify Section 5 as follows

5. ADDITIONS AND ALTERATIONS

5.1 Additions. Additions to existing dwelling units shall comply with either Section 5.1.1 or Section 5.1.2.

5.1.1 Prescriptive Compliance. Additions shall comply with Section 5.1.1(a) through (d):

- a. Envelope assemblies: All new envelope assemblies comprising the addition shall meet or exceed the envelope assembly characteristics of Table 6-3 and Table 7-2.
- b. Heating and cooling systems: New heating, cooling, and duct systems that are part of the addition shall comply with Section 7.2 and either Table 5-1 or Table 5-2.
- c. Service water heating systems: New service water heating systems that are part of the addition shall comply with Section 7.4 and Table 5-3.
- d. Lighting: New lighting systems that are part of the addition shall comply with Section 7.5.

5.1.2 Performance Alternative. The building shall comply with either Section 5.1.2.1 or 5.1.2.2.

5.1.2.1 No-Additional-Energy Option. The addition shall comply on a performance basis where the annual equivalent energy use of the addition and the existing dwelling unit, taken together, is less than or equal to the annual equivalent energy use of the existing dwelling unit, where the equivalent energy use for fossil fuels is calculated as follows:

$$\text{kWh}_{eq} = (\text{Btu}_{fossil} \times 0.40) / 3412 \quad [\text{I-P}] \quad (5-1)$$

$$\text{kWh}_{eq} = (\text{MJ}_{fossil} \times 0.40) / 3.6 \quad [\text{SI}] \quad (5-1)$$

Informative Note: This option may be preferable when the addition is small as compared to the existing building.

5.1.2.2 Combined Energy Rating Index (ERI) Option. The addition shall comply if the combined building—addition plus existing structure—meets the ERI in Table 5-4.

Informative Note: This option may be more appropriate when the addition is large as compared to the existing building.

5.2 Alterations. *Alterations to existing dwelling units shall be such that the altered dwelling unit uses no more energy than the existing dwelling unit prior to its alteration. Alterations to existing dwelling units shall comply with Sections 5.2.1 through 5.2.4. Alterations shall comply with Sections 5.2.1 or 5.2.2*

5.2.1 Prescriptive Compliance *Alterations to existing dwelling units shall comply with Sections 5.2.1.1 through 5.2.1.4.*

5.2.1.1 5.2.1 Envelope Assemblies. All new envelope assemblies comprising the alteration shall meet or exceed the envelope assembly characteristics of Table 6-3 and Table 7-2.

5.2.1.2 5.2.2 Heating and Cooling Systems. New heating, cooling, and duct systems that are part of the alteration shall comply with Section 7.2 and either Table 5-1 or Table 5-2.

5.2.1.3 5.2.3 Service Water Heating Systems. New service water heating systems that are part of the alteration shall comply with Section 7.4 and Table 5-3.

5.2.1.4 5.2.4 Lighting. The alteration of lighting systems, including the replacement of light sources plus ballast, power supplies, and drivers, in any building space or exterior area shall comply with the requirements in Section 7.5 applicable to that space or area. Such alterations shall include all luminaires and controls that are added, replaced, or removed. Alterations do not include routine maintenance or repair situations.

Exception to 5.2.1.4: Exception to 5.2.4: *Alterations that involve less than 10% of the connected lighting load in a space or area need not comply with these requirements provided the alteration does not increase the installed connected lighting load.*

5.2.2 No-Additional-Energy Option *Alterations to existing dwelling units shall comply with Sections 5.2.1.1 and 5.2.1.4, and the alteration shall comply on a performance basis where the annual equivalent energy use of the alteration and the existing dwelling unit, taken together, is less than or equal to the annual equivalent energy use of the existing dwelling unit, where the equivalent energy use for fossil fuels is calculated in accordance with Equation 5-1.*

5.3 Substantial Energy Alterations. *Substantial energy alterations to existing dwelling units shall comply with the requirements of Sections 5.2.1.1 and 5.2.1.4, and shall be planned, designed, and constructed to achieve the ERI by climate zone shown in Table 5-4.*

Exception to 5.3: *Multifamily buildings and townhouses.*

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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.

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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.

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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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