

ADDENDA

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

Energy Standard for Buildings Except Low-Rise Residential Buildings

Approved by the ASHRAE Standards Committee on June 25, 2022; by the ASHRAE Board of Directors on June 29, 2022; by the Illuminating Engineering Society on June 17, 2022; and by the American National Standards Institute on July 29, 2022.

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FOREWORD

When HVAC equipment efficiency adjustment equations were removed from Normative Appendix G in Standard 90.1-2016 Addendum z, a reference to those equations was inadvertently left in. Addendum z also removed the dependency on capacity for PTAC and PTHP equipment efficiency in the baseline and instead specifies a single efficiency value for that equipment. However, language addressing how to determine the correct capacity for use when establishing baseline efficiency was inadvertently left in. Addendum cq fixes both of these oversights.

Addendum x to 90.1-2019 also changed terminology from “water-cooled” to “liquid-cooled” for various chillers. Addendum cq makes Appendix G consistent with that change.

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 cq to Standard 90.1-2019

Modify Normative Appendix G as shown (I-P). (Note: The text below includes changes previously made by Addendum w to Standard 90.1-2019, which can be downloaded from the ASHRAE website at <https://www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda/addenda-to-standard-90-1-2019>.)

[. . .]

G3.1.2.1 Equipment Efficiencies. All HVAC equipment in the baseline building design shall be modeled at the minimum efficiency levels, both part load and full load, in accordance with Tables G3.5.1 through G3.5.6. Where multiple HVAC zones or residential spaces are combined into a single thermal block in accordance with Table G3.1, the efficiencies (for baseline HVAC System Types ~~1, 2, 3~~, 4, 9, and 10) taken from Tables G3.5.1, G3.5.2, ~~G3.5.4~~, and G3.5.5 shall be based on the equipment capacity of the thermal block divided by the number of HVAC zones or residential spaces. HVAC System Types 5 or 6 efficiencies taken from Table G3.5.1 shall be based on the cooling equipment capacity of a single floor when grouping identical floors in accordance with Section G3.1.1(a)(4). Fan energy shall be modeled separately according to Section G3.1.2.9.

Table G3.1 Modeling Requirements for Calculating Proposed Building Performance and Baseline Building Performance (I-P)

No.	Proposed Building Performance	Baseline Building Performance
[. . .]		
10.	HVAC Systems	
	<p>The HVAC system type and all related performance parameters in the proposed design, such as equipment capacities and efficiencies, shall be determined as follows:</p> <p>[. . .]</p> <p>b. Where an HVAC system has been designed and submitted with design documents, the HVAC model shall be consistent with design documents. Mechanical equipment efficiencies shall be adjusted from actual design conditions to the standard rating conditions specified in Section 6.4.1 if required by the simulation model. Where efficiency ratings include supply fan energy, the efficiency rating shall be adjusted to remove the supply fan energy from the efficiency rating in the baseline building design. The equations in Section G3.1.2.1 shall not be used in the proposed design. The proposed design HVAC system shall be modeled using manufacturers’ full- and part-load data for the HVAC system without fan power.</p> <p>[. . .]</p>	

Table G3.1.3.7 Type and Number of Chillers (I-P)

Peak Coincident Cooling Load of Baseline HVAC systems using chilled water	Number and Type of Chillers
≤300 tons	1 water liquid-cooled screw chiller
>300 tons, <600 tons	2 water liquid-cooled screw chillers sized equally
≥600 tons	2 water liquid-cooled centrifugal chillers minimum with chillers added so that no chiller is larger than 800 tons, all sized equally

Table G3.5.3 Performance Rating Method Water-Chilling Packages—Minimum Efficiency Requirements (I-P)

Equipment Type	Size Category	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
Water Liquid-cooled, electrically operated, positive displacement (rotary screw and scroll)	<150 tons	kW/ton	0.790 FL 0.676 IPLV.IP	ARI 550/590
	≥150 tons and <300 tons		0.718 FL 0.629 IPLV.IP	
	≥300 tons		0.639 FL 0.572 IPLV.IP	
Water Liquid-cooled, electrically operated, centrifugal	<150 tons	kW/ton	0.703 FL 0.670 IPLV.IP	ARI 550/590
	≥150 tons and <300 tons		0.634 FL 0.596 IPLV.IP	
	≥300 tons		0.576 FL 0.549 IPLV.IP	

Modify Normative Appendix G as shown (SI).

G3.1.2.1 Equipment Efficiencies. All HVAC equipment in the baseline building design shall be modeled at the minimum efficiency levels, both part load and full load, in accordance with Tables G3.5.1 through G3.5.6. Where multiple HVAC zones or residential spaces are combined into a single thermal block in accordance with Table G3.1, the efficiencies (for baseline HVAC System Types 1, 2, 3, 4, 9, and 10) taken from Tables G3.5.1, G3.5.2, G3.5.4, and G3.5.5 shall be based on the equipment capacity of the thermal block divided by the number of HVAC zones or residential spaces. HVAC System Types 5 or 6 efficiencies taken from Table G3.5.1 shall be based on the cooling equipment capacity of a single floor when grouping identical floors in accordance with Section G3.1.1(a)(4). Fan energy shall be modeled separately according to Section G3.1.2.9.

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

No.	Proposed Building Performance	Baseline Building Performance
[...]		
10.	HVAC Systems	
	<p>The <i>HVAC system</i> type and all related performance parameters in the <i>proposed design</i>, such as <i>equipment</i> capacities and efficiencies, shall be determined as follows:</p> <p>[...]</p> <p>b. Where an <i>HVAC system</i> has been designed and submitted with design documents, the HVAC model shall be consistent with design documents. Mechanical <i>equipment</i> efficiencies shall be adjusted from actual <i>design conditions</i> to the standard rating conditions specified in Section 6.4.1 if required by the simulation model. Where <i>efficiency</i> ratings include supply fan <i>energy</i>, the <i>efficiency</i> rating shall be adjusted to remove the supply fan <i>energy</i> from the <i>efficiency</i> rating in the <i>baseline building design</i>. The equations in Section G3.1.2.1 shall not be used in the proposed design. The <i>proposed design HVAC system</i> shall be modeled using <i>manufacturers'</i> full- and part-load data for the <i>HVAC system</i> without fan power.</p> <p>[...]</p>	

Table G3.1.3.7 Type and Number of Chillers (SI)

Peak Coincident Cooling Load of Baseline HVAC systems using chilled water	Number and Type of Chillers
≤1055 kW	1 water liquid -cooled screw chiller
>1055 kW, <2110 kW	2 water liquid -cooled screw chillers sized equally
≥2110 kW	2 water liquid -cooled centrifugal chillers minimum with chillers added so that no chiller is larger than 2813 kW, all sized equally

Table G3.5.3 Performance Rating Method Water-Chilling Packages—Minimum Efficiency Requirements (SI)

Equipment Type	Size Category	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
Water Liquid -cooled, electrically operated, positive displacement (rotary screw and scroll)	<528 kW	COP	4.45 COP 5.20 IPLV.SI	ARI 550/590
	≥528 kW and <1055 kW		4.90 COP 5.60 IPLV.SI	
	≥1055 kW		5.50 COP 6.15 IPLV.SI	
Water Liquid -cooled, electrically operated, centrifugal	<528 kW	COP	5.00 COP 5.25 IPLV.SI	ARI 550/590
	≥528 kW and <1055 kW		5.55 COP 5.90 IPLV.SI	
	≥1055 kW		6.10 COP 6.40 IPLV.SI	

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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.

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