



**BSR/ASHRAE/IES Addendum be
to ANSI/ASHRAE/IES Standard 90.1-2016**

Public Review Draft

Proposed Addendum be to Standard 90.1-2016, Energy Standard for Buildings Except Low-Rise Residential Buildings

**Second Public Review (November 2018)
(Draft Shows Proposed Changes to Current Standard)**

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ASHRAE, 1791 Tullie Circle, NE, Atlanta GA 30329-2305

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FOREWORD

This addendum updates the efficiency requirements for Computer Room air conditioners as listed in table 6.8.1-11 and adds a new table 6.8.1-19. The following changes are being made.

- The current products listed in table 6.8.1-11 are for floor mounted computer room units and this is being clarified as part of the addendum change. The efficiencies are being updated to better align with the industry levels and are in most product classes increasing in the order of 3-5%. A quick check of the cost effectiveness shows that payback periods are in the order of 2-3 years and well below what the scalar limit of 10 for a 15 year life so the change is cost effective.
- The second change that is being made is to add a new table 6.8-1-19 which covers small ceiling mounted computer room units. This is a new table and reflects current industry products and is being added to cover these products in the standard. As it is current products no cost justification has been done.

Both these changes were developed by the AHRI Datacom Cooling Section and was agreed to and approved by the industry.

[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~striketrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]

Addendum BE to 90.1-2016

Modify section 6.4.1.1 to add the reference to the new table 6.8.1-19 and clarify 6.8.1-11 as shown below.

6.4.1.1 Minimum Equipment Efficiencies—Listed Equipment—Standard Rating and Operating Conditions

Equipment shown in Tables 6.8.1-1 through 6.8.1-16, 19 shall have a minimum performance at the specified rating conditions when tested in accordance with the specified test procedure. Where multiple rating conditions or performance requirements are provided, the *equipment* shall satisfy all stated requirements unless otherwise exempted by footnotes in the table. *Equipment* covered under the Federal Energy Policy Act of 1992 (EPACT) shall have no minimum *efficiency* requirements for operation at minimum capacity or other than standard rating conditions. *Equipment* used to provide *service water-heating* functions as part of a combination *system* shall satisfy all stated requirements for the appropriate *space* heating or cooling category.

Tables are as follows:

- k Table 6.8.1-11, “Floor Mounted Air Conditioners and *Condensing Units* Serving Computer Rooms”
- r “Table 6.8.1-19, Ceiling Mounted Computer Room Air Conditioners – Minimum Efficiency Requirements”

Delete the computer room table 6.8.1-11 for IP units

Table 6.8.1-11 Air Conditioners and Condensing Units Serving Computer Rooms—Minimum Efficiency Requirements

Equipment Type	Net Sensible Cooling Capacity	Standard Model	Minimum Net Sensible COP _c			Test Procedure
			Return Air Dry-Bulb Temperature/ and Dew-Point Temperature			
			Class 1	Class 2	Class 3	
			75°F/52°F	85°F/52°F	95°F/52°F	
Air-cooled	<65,000 Btu/h	Downflow unit		2.30		AHRI 1360
		Upflow unit—ducted		2.40		
		Upflow unit—nonducted	2.00			
		Horizontal-flow unit			2.45	
	≥65,000 and <240,000 Btu/h	Downflow unit		2.20		
		Upflow unit—ducted		2.05		
		Upflow unit—nonducted	1.90			
		Horizontal-flow unit			2.35	
	≥240,000 Btu/h	Downflow unit		2.00		
		Upflow unit—ducted		1.85		
		Upflow unit—nonducted	1.70			
		Horizontal-flow unit			2.15	
Water-cooled	<65,000 Btu/h	Downflow unit		2.50		AHRI 1360
		Upflow unit—ducted		2.30		
		Upflow unit—nonducted	2.25			

	$\geq 65,000$ and $< 240,000$ Btu/h	Horizontal-flow unit			2.70	
		Downflow unit		2.40		
		Upflow unit—ducted		2.20		
		Upflow unit—nonducted	2.15			
	$\geq 240,000$ Btu/h	Horizontal-flow unit			2.60	
		Downflow unit		2.25		
		Upflow unit—ducted		2.10		
		Upflow unit—nonducted	2.05			
		Horizontal-flow unit			2.45	
Water-cooled with fluid economizer	$< 65,000$ Btu/h	Downflow unit		2.45		AHRI 1360
		Upflow unit—ducted		2.25		
		Upflow unit—nonducted	2.20			
		Horizontal-flow unit			2.60	
	$\geq 65,000$ and $< 240,000$ Btu/h	Downflow unit		2.35		
		Upflow unit—ducted		2.15		
		Upflow unit—nonducted	2.10			
		Horizontal-flow unit			2.55	
	$\geq 240,000$ Btu/h	Downflow unit		2.20		
		Upflow unit—ducted		2.05		
		Upflow unit—nonducted	2.00			
		Horizontal-flow unit			2.40	
Glycol cooled	$< 65,000$ Btu/h	Downflow unit		2.30		AHRI 1360
		Upflow unit—ducted		2.10		
		Upflow unit—nonducted	2.00			
		Horizontal-flow unit			2.40	
	$\geq 65,000$ and $< 240,000$ Btu/h	Downflow unit		2.05		
		Upflow unit—ducted		1.85		
		Upflow unit—nonducted	1.85			
		Horizontal-flow unit			2.15	
	$\geq 240,000$ Btu/h	Downflow unit		1.95		
		Upflow unit—ducted		1.80		
		Upflow unit—nonducted	1.75			
		Horizontal-flow unit			2.10	
Glycol cooled with fluid economizer	$< 65,000$ Btu/h	Downflow unit		2.25		AHRI 1360
		Upflow unit—ducted		2.10		
		Upflow unit—nonducted	2.00			
		Horizontal-flow unit			2.35	
	$\geq 65,000$ and $< 240,000$ Btu/h	Downflow unit		1.95		
		Upflow unit—ducted		1.80		
		Upflow unit—nonducted	1.75			
		Horizontal-flow unit			2.10	
		Downflow unit		1.90		

	$\geq 240,000$ Btu/h	Upflow unit—ducted		1.80	
		Upflow unit—nonducted	1.70		
		Horizontal-flow unit			2.10

Add the revised computer room table 6.8.1-11 for IP units

Table 6.8.1-11 Floor Mounted Air Conditioners and Condensing Units Serving Computer Rooms—Minimum Efficiency Requirements

<u>Equipment Type</u>	<u>Standard Model</u>	<u>Net Sensible Cooling Capacity</u>	<u>Minimum Net Sensible COP</u>	<u>Rating Conditions Return air (dry bulb/wet bulb)</u>	<u>Test Procedure</u>
<u>Air Cooled</u>	<u>Downflow</u>	<80,000 Btu/h	<u>2.70</u>	<u>85°F/52°F (Class 2)</u>	<u>AHRI 1360</u>
		≥80,000 and <295,000 Btu/h	<u>2.58</u>		
		≥295,000 Btu/h	<u>2.36</u>		
	<u>Upflow - Ducted</u>	<80,000 Btu/h	<u>2.67</u>		
		≥80,000 and <295,000 Btu/h	<u>2.55</u>		
		≥295,000 Btu/h	<u>2.33</u>		
	<u>Upflow - Non Ducted</u>	<65,000 Btu/h	<u>2.16</u>	<u>75°F/52°F (Class 1)</u>	
		≥65,000 and <240,000 Btu/h	<u>2.04</u>		
		≥240,000 Btu/h	<u>1.89</u>		
	<u>Horizontal</u>	<65,000 Btu/h	<u>2.65</u>	<u>95°F/52°F (Class 3)</u>	
		≥65,000 and <240,000 Btu/h	<u>2.55</u>		
		≥240,000 Btu/h	<u>2.47</u>		
<u>Air Cooled with Fluid Economizer</u>	<u>Downflow</u>	<80,000 Btu/h	<u>2.70</u>	<u>85°F/52°F (Class 2)</u>	<u>AHRI 1360</u>
		≥80,000 and <295,000 Btu/h	<u>2.58</u>		
		≥295,000 Btu/h	<u>2.36</u>		
	<u>Upflow - Ducted</u>	<80,000 Btu/h	<u>2.67</u>		
		≥80,000 and <295,000 Btu/h	<u>2.55</u>		
		≥295,000 Btu/h	<u>2.33</u>		
	<u>Upflow - Non Ducted</u>	<65,000 Btu/h	<u>2.09</u>	<u>75°F/52°F (Class 1)</u>	
		≥65,000 and <240,000 Btu/h	<u>1.99</u>		
		≥240,000 Btu/h	<u>1.81</u>		
	<u>Horizontal</u>	<65,000 Btu/h	<u>2.65</u>	<u>95°F/52°F (Class 3)</u>	
		≥65,000 and <240,000 Btu/h	<u>2.55</u>		
		≥240,000 Btu/h	<u>2.47</u>		
<u>Water Cooled</u>	<u>Downflow</u>	<80,000 Btu/h	<u>2.82</u>	<u>85°F/52°F (Class 2)</u>	<u>AHRI 1360</u>
		≥80,000 and <295,000 Btu/h	<u>2.73</u>		
		≥295,000 Btu/h	<u>2.67</u>		
	<u>Upflow - Ducted</u>	<80,000 Btu/h	<u>2.79</u>		
		≥80,000 and <295,000 Btu/h	<u>2.70</u>		
		≥295,000 Btu/h	<u>2.64</u>		
	<u>Upflow - Non Ducted</u>	<65,000 Btu/h	<u>2.43</u>	<u>75°F/52°F (Class 1)</u>	
		≥65,000 and <240,000 Btu/h	<u>2.32</u>		

		$\geq 240,000$ Btu/h	<u>2.20</u>		
	<u>Horizontal</u>	$< 65,000$ Btu/h	<u>2.79</u>	<u>95°F/52°F (Class 3)</u>	
		$\geq 65,000$ and $< 240,000$ Btu/h	<u>2.68</u>		
		$\geq 240,000$ Btu/h	<u>2.60</u>		
<u>Water Cooled with Fluid Economizer</u>	<u>Downflow</u>	$< 80,000$ Btu/h	<u>2.77</u>	<u>85°F/52°F (Class 2)</u>	<u>AHRI 1360</u>
		$\geq 80,000$ and $< 295,000$ Btu/h	<u>2.68</u>		
		$\geq 295,000$ Btu/h	<u>2.61</u>		
	<u>Upflow - Ducted</u>	$< 80,000$ Btu/h	<u>2.74</u>		
		$\geq 80,000$ and $< 295,000$ Btu/h	<u>2.65</u>		
		$\geq 295,000$ Btu/h	<u>2.58</u>		
	<u>Upflow - Non Ducted</u>	$< 65,000$ Btu/h	<u>2.35</u>	<u>75°F/52°F (Class 1)</u>	
		$\geq 65,000$ and $< 240,000$ Btu/h	<u>2.24</u>		
		$\geq 240,000$ Btu/h	<u>2.12</u>		
	<u>Horizontal</u>	$< 65,000$ Btu/h	<u>2.71</u>	<u>95°F/52°F (Class 3)</u>	
		$\geq 65,000$ and $< 240,000$ Btu/h	<u>2.60</u>		
		$\geq 240,000$ Btu/h	<u>2.54</u>		
<u>Glycol Cooled</u>	<u>Downflow</u>	$< 80,000$ Btu/h	<u>2.56</u>	<u>85°F/52°F (Class 2)</u>	<u>AHRI 1360</u>
		$\geq 80,000$ and $< 295,000$ Btu/h	<u>2.24</u>		
		$\geq 295,000$ Btu/h	<u>2.21</u>		
	<u>Upflow - Ducted</u>	$< 80,000$ Btu/h	<u>2.53</u>		
		$\geq 80,000$ and $< 295,000$ Btu/h	<u>2.21</u>		
		$\geq 295,000$ Btu/h	<u>2.18</u>		
	<u>Upflow - Non Ducted</u>	$< 65,000$ Btu/h	<u>2.08</u>	<u>75°F/52°F (Class 1)</u>	
		$\geq 65,000$ and $< 240,000$ Btu/h	<u>1.90</u>		
		$\geq 240,000$ Btu/h	<u>1.81</u>		
	<u>Horizontal</u>	$< 65,000$ Btu/h	<u>2.48</u>	<u>95°F/52°F (Class 3)</u>	
		$\geq 65,000$ and $< 240,000$ Btu/h	<u>2.18</u>		
		$\geq 240,000$ Btu/h	<u>2.18</u>		
<u>Glycol Cooled with Fluid Economizer</u>	<u>Downflow</u>	$< 80,000$ Btu/h	<u>2.51</u>	<u>85°F/52°F (Class 2)</u>	<u>AHRI 1360</u>
		$\geq 80,000$ and $< 295,000$ Btu/h	<u>2.19</u>		
		$\geq 295,000$ Btu/h	<u>2.15</u>		
	<u>Upflow - Ducted</u>	$< 80,000$ Btu/h	<u>2.48</u>		
		$\geq 80,000$ and $< 295,000$ Btu/h	<u>2.16</u>		
		$\geq 295,000$ Btu/h	<u>2.12</u>		
	<u>Upflow - Non Ducted</u>	$< 65,000$ Btu/h	<u>2.00</u>	<u>75°F/52°F (Class 1)</u>	
		$\geq 65,000$ and $< 240,000$ Btu/h	<u>1.82</u>		
		$\geq 240,000$ Btu/h	<u>1.73</u>		
	<u>Horizontal</u>	$< 65,000$ Btu/h	<u>2.44</u>	<u>95°F/52°F (Class 3)</u>	

		<u>≥65,000 and <240,000 Btu/h</u>	<u>2.10</u>		
		<u>≥240,000 Btu/h</u>	<u>2.10</u>		

Delete the computer room table 6.8.1-11 for SI Units

Table 6.8.1-11 Air Conditioners and Condensing Units Serving Computer Rooms—Minimum Efficiency Requirements

Equipment Type	Net Sensible Cooling Capacity	Standard Model	Minimum Net Sensible COP _c			Test Procedure
			Return Air Dry-Bulb Temperature/ and Dew-Point Temperature			
			Class 1	Class 2	Class 3	
			24°C/11°C	20.5°C/11°C	35°C/11°C	
Air-cooled	<19 kW	Downflow unit		2.30		AHRI 1360
		Upflow unit—ducted		2.10		
		Upflow unit—nonducted	2.09			
		Horizontal-flow unit			2.45	
	≥19 kW and <70 kW	Downflow unit		2.20		
		Upflow unit—ducted		2.05		
		Upflow unit—nonducted	1.99			
		Horizontal-flow unit			2.35	
	≥70 kW	Downflow unit		2.00		
		Upflow unit—ducted		1.85		
		Upflow unit—nonducted	1.79			
		Horizontal-flow unit			2.15	
<u>Air-cooled with Fluid Economizer</u>	<19 kW/h	<u>Downflow unit</u>		<u>2.45</u>		AHRI 1360
		<u>Upflow unit—ducted</u>		<u>2.26</u>		
		<u>Upflow unit—nonducted</u>	<u>2.09</u>			
		<u>Horizontal-flow unit</u>			<u>2.48</u>	
	≥19 kW and <70 kW	<u>Downflow unit</u>		<u>2.34</u>		
		<u>Upflow unit—ducted</u>		<u>2.15</u>		
		<u>Upflow unit—nonducted</u>	<u>1.99</u>			
		<u>Horizontal-flow unit</u>			<u>2.47</u>	
	≥70 kW	<u>Downflow unit</u>		<u>2.11</u>		
		<u>Upflow unit—ducted</u>		<u>1.92</u>		
		<u>Upflow unit—nonducted</u>	<u>1.81</u>			
		<u>Horizontal-flow unit</u>			<u>2.39</u>	
Water-cooled	<19 kW	Downflow unit		2.50		AHRI 1360
		Upflow unit—ducted		2.30		
		Upflow unit—nonducted	2.25			
		Horizontal-flow unit			2.70	
	≥19 kW and <70 kW	Downflow unit		2.40		
		Upflow unit—ducted		2.20		
		Upflow unit—nonducted	2.15			
		Horizontal-flow unit			2.60	
		Downflow unit		2.25		

	≥ 70 kW	Upflow unit—ducted		2.10			
		Upflow unit—nonducted	2.05				
		Horizontal-flow unit			2.45		
Water-cooled with <i>fluid economizer</i>	< 10 kW	Downflow unit		2.45		AHRI 1360	
		Upflow unit—ducted		2.25			
		Upflow unit—nonducted	2.20				
		Horizontal-flow unit			2.60		
	≥ 10 kW and < 70 kW	Downflow unit		2.35			
		Upflow unit—ducted		2.15			
		Upflow unit—nonducted	2.10				
		Horizontal-flow unit			2.55		
	≥ 70 kW	Downflow unit		2.20			
		Upflow unit—ducted		2.05			
		Upflow unit—nonducted	2.00				
		Horizontal-flow unit			2.40		
Glycol-cooled	< 10 kW	Downflow unit		2.30		AHRI 1360	
		Upflow unit—ducted		2.10			
		Upflow unit—nonducted	2.00				
		Horizontal-flow unit			2.40		
	≥ 10 kW and < 70 kW	Downflow unit		2.05			
		Upflow unit—ducted		1.85			
		Upflow unit—nonducted	1.85				
		Horizontal-flow unit			2.15		
	≥ 70 kW	Downflow unit		1.95			
		Upflow unit—ducted		1.80			
		Upflow unit—nonducted	1.75				
		Horizontal-flow unit			2.10		
Glycol-cooled with <i>fluid economizer</i>	< 10 kW	Downflow unit		2.25		AHRI 1360	
		Upflow unit—ducted		2.10			
		Upflow unit—nonducted	2.00				
		Horizontal-flow unit			2.35		
	≥ 10 kW and < 70 kW	Downflow unit		1.95			
		Upflow unit—ducted		1.80			
		Upflow unit—nonducted	1.75				
		Horizontal-flow unit			2.10		
	≥ 70 kW	Downflow unit		1.90			
		Upflow unit—ducted		1.80			
		Upflow unit—nonducted	1.70				
		Horizontal-flow unit			2.10		

Add the computer room table 6.8.1-11 for SI Units

Table 6.8.1-11 Floor Mounted Air Conditioners and Condensing Units Serving Computer Rooms—Minimum Efficiency Requirements

<u>Equipment Type</u>	<u>Standard Model</u>	<u>Net Sensible Cooling Capacity</u>	<u>Minimum Net Sensible COP</u>	<u>Rating Conditions Return air (dry bulb/wet bulb)</u>	<u>Test Procedure</u>	
<u>Air Cooled</u>	<u>Downflow</u>	<23 KW	2.70	29 °C/11 °C (Class 2)	<u>AHRI 1361</u>	
		≥23 and <86 KW	2.58			
		≥86 KW	2.36			
	<u>Upflow - Ducted</u>	<23 KW	2.67			
		≥23 and <86 KW	2.55			
		≥86 KW	2.33			
	<u>Upflow - Non Ducted</u>	<19 KW	2.16			24 °C/11 °C (Class 1)
		≥19 and <70 KW	2.04			
		≥70 KW	1.89			
	<u>Horizontal</u>	<19 KW	2.65	35 °C/11 °C (Class 3)		
		≥19 and <70 KW	2.55			
		≥70 KW	2.47			
<u>Air Cooled with Fluid Economizer</u>	<u>Downflow</u>	<23 KW	2.70	29 °C/11 °C (Class 2)	<u>AHRI 1361</u>	
		≥23 and <86 KW	2.58			
		≥86 KW	2.36			
	<u>Upflow - Ducted</u>	<23 KW	2.67			
		≥23 and <86 KW	2.55			
		≥86 KW	2.33			
	<u>Upflow - Non Ducted</u>	<19 KW	2.09			24 °C/11 °C (Class 1)
		≥19 and <70 KW	1.99			
		≥70 KW	1.81			
	<u>Horizontal</u>	<19 KW	2.65	35 °C/11 °C (Class 3)		
		≥19 and <70 KW	2.55			
		≥70 KW	2.47			
<u>Water Cooled</u>	<u>Downflow</u>	<23 KW	2.82	29 °C/11 °C (Class 2)	<u>AHRI 1361</u>	
		≥23 and <86 KW	2.73			
		≥86 KW	2.67			
	<u>Upflow - Ducted</u>	<23 KW	2.79			
		≥23 and <86 KW	2.70			
		≥86 KW	2.64			
	<u>Upflow - Non Ducted</u>	<19 KW	2.43			24 °C/11 °C (Class 1)

	<u>Horizontal</u>	≥ 19 and < 70 KW	<u>2.32</u>	<u>35 °C/11 °C (Class 3)</u>	
		≥ 70 KW	<u>2.20</u>		
		< 19 KW	<u>2.79</u>		
		≥ 19 and < 70 KW	<u>2.68</u>		
		≥ 70 KW	<u>2.60</u>		
<u>Water Cooled with Fluid Economizer</u>	<u>Downflow</u>	< 23 KW	<u>2.77</u>	<u>29 °C/11 °C (Class 2)</u>	<u>AHRI 1361</u>
		≥ 23 and < 86 KW	<u>2.68</u>		
		≥ 86 KW	<u>2.61</u>		
	<u>Upflow - Ducted</u>	< 23 KW	<u>2.74</u>		
		≥ 23 and < 86 KW	<u>2.65</u>		
		≥ 86 KW	<u>2.58</u>		
	<u>Upflow - Non Ducted</u>	< 19 KW	<u>2.35</u>	<u>24 °C/11 °C (Class 1)</u>	
		≥ 19 and < 70 KW	<u>2.24</u>		
		≥ 70 KW	<u>2.12</u>		
	<u>Horizontal</u>	< 19 KW	<u>2.71</u>	<u>35 °C/11 °C (Class 3)</u>	
			<u>2.60</u>		
		≥ 19 and < 70 KW	<u>2.60</u>		
<u>2.54</u>					
<u>Glycol Cooled</u>	<u>Downflow</u>	< 23 KW	<u>2.56</u>	<u>29 °C/11 °C (Class 2)</u>	<u>AHRI 1360</u>
		≥ 23 and < 86 KW	<u>2.24</u>		
		≥ 86 KW	<u>2.21</u>		
	<u>Upflow - Ducted</u>	< 23 KW	<u>2.53</u>		
		≥ 23 and < 86 KW	<u>2.21</u>		
		≥ 86 KW	<u>2.18</u>		
	<u>Upflow - Non Ducted</u>	< 19 KW	<u>2.08</u>	<u>24 °C/11 °C (Class 1)</u>	
		≥ 19 and < 70 KW	<u>1.90</u>		
		≥ 70 KW	<u>1.81</u>		
	<u>Horizontal</u>	< 19 KW	<u>2.48</u>	<u>35 °C/11 °C (Class 3)</u>	
			<u>2.18</u>		
		≥ 19 and < 70 KW	<u>2.18</u>		
<u>Glycol Cooled with Fluid Economizer</u>	<u>Downflow</u>	< 23 KW	<u>2.51</u>	<u>29 °C/11 °C (Class 2)</u>	<u>AHRI 1361</u>
		≥ 23 and < 86 KW	<u>2.19</u>		
		≥ 86 KW	<u>2.15</u>		
	<u>Upflow - Ducted</u>	< 23 KW	<u>2.48</u>		
		≥ 23 and < 86 KW	<u>2.16</u>		
		≥ 86 KW	<u>2.12</u>		
	<u>Upflow - Non Ducted</u>	< 19 KW	<u>2.00</u>	<u>24 °C/11 °C (Class 1)</u>	
		≥ 19 and < 70 KW	<u>1.82</u>		

<u>Horizontal</u>	<u>≥70 KW</u>	<u>1.73</u>	<u>35 °C/11 °C (Class 3)</u>
	<u><19 KW</u>	<u>2.44</u>	
	<u>≥19 and <70 KW</u>	<u>2.10</u>	
	<u>≥70 KW</u>	<u>2.10</u>	

Add a new table 6.8.1-19 for Ceiling Mounted Computer Room Units for IP Units

Table 6.8.1-19 Ceiling Mounted Computer Room Air Conditioners —Minimum Efficiency Requirements

<u>Equipment Type</u>	<u>Standard Model</u>	<u>Net Sensible Cooling Capacity</u>	<u>Minimum Net Sensible COP</u>	<u>Rating Conditions Return air (dry bulb/wet bulb)</u>	<u>Test Procedure</u>
<u>Air Cooled with Free Air Discharge Condenser</u>	<u>Ducted</u>	<u><29,000 Btu/h</u>	<u>2.05</u>	<u>75°F/52°F (Class 1)</u>	<u>AHRI 1360</u>
		<u>≥29,000 and <65,000 Btu/h</u>	<u>2.02</u>		
		<u>≥65,000 Btu/h</u>	<u>1.92</u>		
	<u>Nonducted</u>	<u><29,000 Btu/h</u>	<u>2.08</u>		
		<u>≥29,000 and <65,000 Btu/h</u>	<u>2.05</u>		
		<u>≥65,000 Btu/h</u>	<u>1.94</u>		
<u>Air Cooled with Free Air Discharge Condenser with fluid economizer</u>	<u>Ducted</u>	<u><29,000 Btu/h</u>	<u>2.01</u>	<u>75°F/52°F (Class 1)</u>	<u>AHRI 1360</u>
		<u>≥29,000 and <65,000 Btu/h</u>	<u>1.97</u>		
		<u>≥65,000 Btu/h</u>	<u>1.87</u>		
	<u>Nonducted</u>	<u><29,000 Btu/h</u>	<u>2.04</u>		
		<u>≥29,000 and <65,000 Btu/h</u>	<u>2.00</u>		
		<u>≥65,000 Btu/h</u>	<u>1.89</u>		
<u>Air Cooled with Ducted Condenser</u>	<u>Ducted</u>	<u><29,000 Btu/h</u>	<u>1.86</u>	<u>75°F/52°F (Class 1)</u>	<u>AHRI 1360</u>
		<u>≥29,000 and <65,000 Btu/h</u>	<u>1.83</u>		
		<u>≥65,000 Btu/h</u>	<u>1.73</u>		
	<u>Nonducted</u>	<u><29,000 Btu/h</u>	<u>1.89</u>		
		<u>≥29,000 and <65,000 Btu/h</u>	<u>1.86</u>		
		<u>≥65,000 Btu/h</u>	<u>1.75</u>		
<u>Air Cooled with Fluid Economizer and Ducted Condenser</u>	<u>Ducted</u>	<u><29,000 Btu/h</u>	<u>1.82</u>	<u>75°F/52°F (Class 1)</u>	<u>AHRI 1360</u>
		<u>≥29,000 and <65,000 Btu/h</u>	<u>1.78</u>		
		<u>≥65,000 Btu/h</u>	<u>1.68</u>		
	<u>Nonducted</u>	<u><29,000 Btu/h</u>	<u>1.85</u>		
		<u>≥29,000 and <65,000 Btu/h</u>	<u>1.81</u>		
		<u>≥65,000 Btu/h</u>	<u>1.70</u>		
<u>Water Cooled</u>	<u>Ducted</u>	<u><29,000 Btu/h</u>	<u>2.38</u>	<u>75°F/52°F (Class 1)</u>	<u>AHRI 1360</u>
		<u>≥29,000 and <65,000 Btu/h</u>	<u>2.28</u>		
		<u>≥65,000 Btu/h</u>	<u>2.18</u>		

	<u>Nonducted</u>	<29,000 Btu/h	<u>2.41</u>		
		≥29,000 and <65,000 Btu/h	<u>2.31</u>		
		≥65,000 Btu/h	<u>2.20</u>		
<u>Water Cooled with Fluid Economizer</u>	<u>Ducted</u>	<29,000 Btu/h	<u>2.33</u>	<u>75°F/52°F (Class 1)</u>	<u>AHRI 1360</u>
		≥29,000 and <65,000 Btu/h	<u>2.23</u>		
		≥65,000 Btu/h	<u>2.13</u>		
	<u>Nonducted</u>	<29,000 Btu/h	<u>2.36</u>		
		≥29,000 and <65,000 Btu/h	<u>2.26</u>		
		≥65,000 Btu/h	<u>2.16</u>		
<u>Glycol Cooled</u>	<u>Ducted</u>	<29,000 Btu/h	<u>1.97</u>	<u>75°F/52°F (Class 1)</u>	<u>AHRI 1360</u>
		≥29,000 and <65,000 Btu/h	<u>1.93</u>		
		≥65,000 Btu/h	<u>1.78</u>		
	<u>Nonducted</u>	<29,000 Btu/h	<u>2.00</u>		
		≥29,000 and <65,000 Btu/h	<u>1.98</u>		
		≥65,000 Btu/h	<u>1.81</u>		
<u>Glycol Cooled with Fluid Economizer</u>	<u>Ducted</u>	<29,000 Btu/h	<u>1.92</u>	<u>75°F/52°F (Class 1)</u>	<u>AHRI 1360</u>
		≥29,000 and <65,000 Btu/h	<u>1.88</u>		
		≥65,000 Btu/h	<u>1.73</u>		
	<u>Nonducted</u>	<29,000 Btu/h	<u>1.95</u>		
		≥29,000 and <65,000 Btu/h	<u>1.93</u>		
		≥65,000 Btu/h	<u>1.76</u>		

Add the following new table for SI Units

Table 6.8.1-19 Ceiling Mounted Computer Room Air Conditioners —Minimum Efficiency Requirements

<u>Equipment Type</u>	<u>Standard Model</u>	<u>Net Sensible Cooling Capacity</u>	<u>Minimum Net Sensible COP</u>	<u>Rating Conditions Return air (dry bulb/wet bulb)</u>	<u>Test Procedure</u>
<u>Air Cooled with Free Air Discharge Condenser</u>	<u>Ducted</u>	<8.5 kW	<u>2.05</u>	<u>24°C/11°C (Class 1)</u>	<u>AHRI 1361</u>
		≥8.5 and <19 kW	<u>2.02</u>		
		≥19 kW	<u>1.92</u>		
	<u>Nonducted</u>	<8.5 kW	<u>2.08</u>		
		≥8.5 and <19 kW	<u>2.05</u>		
		≥19 kW	<u>1.94</u>		
<u>Air Cooled with Free Air Discharge Condenser</u>	<u>Ducted</u>	<8.5 kW	<u>2.01</u>	<u>24°C/11°C (Class 1)</u>	<u>AHRI 1360</u>
		≥8.5 and <19 kW	<u>1.97</u>		
		≥19 kW	<u>1.87</u>		
	<u>Nonducted</u>	<8.5 kW	<u>2.04</u>		
		≥8.5 and <19 kW	<u>2.00</u>		
		≥19 kW	<u>1.89</u>		
<u>Air Cooled with Ducted Condenser</u>	<u>Ducted</u>	<8.5 kW	<u>1.86</u>	<u>24°C/11°C (Class 1)</u>	<u>AHRI 1360</u>
		≥8.5 and <19 kW	<u>1.83</u>		
		≥19 kW	<u>1.73</u>		
	<u>Nonducted</u>	<8.5 kW	<u>1.89</u>		
		≥8.5 and <19 kW	<u>1.86</u>		
		≥19 kW	<u>1.75</u>		
<u>Air Cooled with Fluid Economizer and Ducted Condenser</u>	<u>Ducted</u>	<8.5 kW	<u>1.82</u>	<u>24°C/11°C (Class 1)</u>	<u>AHRI 1360</u>
		≥8.5 and <19 kW	<u>1.78</u>		
		≥19 kW	<u>1.68</u>		
	<u>Nonducted</u>	<8.5 kW	<u>1.85</u>		
		≥8.5 and <19 kW	<u>1.81</u>		
		≥19 kW	<u>1.70</u>		
<u>Water Cooled</u>	<u>Ducted</u>	<8.5 kW	<u>2.38</u>	<u>24°C/11°C (Class 1)</u>	<u>AHRI 1360</u>
		≥8.5 and <19 kW	<u>2.28</u>		
		≥19 kW	<u>2.18</u>		
	<u>Nonducted</u>	<8.5 kW	<u>2.41</u>		
		≥8.5 and <19 kW	<u>2.31</u>		
		≥19 kW	<u>2.20</u>		
<u>Water Cooled with Fluid Economizer</u>	<u>Ducted</u>	<8.5 kW	<u>2.33</u>	<u>24°C/11°C (Class 1)</u>	<u>AHRI 1360</u>
		≥8.5 and <19 kW	<u>2.23</u>		
		≥19 kW	<u>2.13</u>		
	<u>Nonducted</u>	<8.5 kW	<u>2.36</u>		
		≥8.5 and <19 kW	<u>2.26</u>		
		≥19 kW	<u>2.16</u>		
<u>Glycol Cooled</u>	<u>Ducted</u>	<8.5 kW	<u>1.97</u>	<u>24°C/11°C (Class 1)</u>	<u>AHRI 1360</u>
		≥8.5 and <19 kW	<u>1.93</u>		
		≥19 kW	<u>1.78</u>		

	<u>Nonducted</u>	<u><8.5 kW</u>	<u>2.00</u>	<u>24°C/11°C (Class 1)</u>	<u>AHRI 1360</u>
		<u>≥8.5 and <19 kW</u>	<u>1.98</u>		
		<u>≥19 kW</u>	<u>1.81</u>		
<u>Glycol Cooled with Fluid Economizer</u>	<u>Ducted</u>	<u><8.5 kW</u>	<u>1.92</u>		
		<u>≥8.5 and <19 kW</u>	<u>1.88</u>		
		<u>≥19 kW</u>	<u>1.73</u>		
	<u>Nonducted</u>	<u><8.5 kW</u>	<u>1.95</u>		
		<u>≥8.5 and <19 kW</u>	<u>1.93</u>		
		<u>≥19 kW</u>	<u>1.76</u>		

Note to Reviewer: Other addenda are modifying section 6.4.1 that are not yet published. The combined changes of this addendum and others will appear as follows (This information is provided for reference only and is not out for comment):

6.4.1 Equipment Efficiencies, Verification, and Labeling Requirements

6.4.1.1 Minimum Equipment Efficiencies—Listed Equipment—Standard Rating and Operating Conditions

Equipment shown in Tables 6.8.1-1 through 6.8.1-19 shall have a minimum performance at the specified rating conditions when tested in accordance with the specified test procedure. Where multiple rating conditions or performance requirements are provided, the *equipment* shall satisfy all stated requirements unless otherwise exempted by footnotes in the table. *Equipment* covered under the Federal *Energy* Policy Act of 1992 (EPACT) shall have no minimum *efficiency* requirements for operation at minimum capacity or other than standard rating conditions. *Equipment* used to provide *service water-heating* functions as part of a combination *system* shall satisfy all stated requirements for the appropriate *space* heating or cooling category.

Tables are as follows:

- a. Table 6.8.1-1, “Electrically Operated Unitary Air Conditioners and *Condensing Units*—Minimum *Efficiency* Requirements”
- b. Table 6.8.1-2, “Electrically Operated Air Cooled Unitary Heat Pumps—Minimum *Efficiency* Requirements”
- c. Table 6.8.1-3, “Water-Chilling Packages—*Efficiency* Requirements” (See Section 6.4.1.2 for water-cooled centrifugal water-chilling packages that are designed to operate at nonstandard conditions.)
- d. Table 6.8.1-4, “Electrically Operated *Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single-Package Vertical Air Conditioners, and Single-Package Vertical Heat Pumps, Room Air Conditioners, and Room Air Conditioner Heat Pumps*—Minimum *Efficiency* Requirements”
- e. Table 6.8.1-5, “Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters—Minimum *Efficiency* Requirements”
- f. Table 6.8.1-6, “Gas- and Oil-Fired *Boilers*—Minimum *Efficiency* Requirements”
- g. Table 6.8.1-7, “Performance Requirements for Heat-Rejection *Equipment*”
- h. Table 6.8.1-8, “Heat Transfer *Equipment*”
- i. Table 6.8.1-9, “Electrically Operated Variable-Refrigerant-Flow Air Conditioners—Minimum *Efficiency* Requirements”
- j. Table 6.8.1-10, “Electrically Operated Variable-Refrigerant-Flow and Applied Heat Pumps—Minimum *Efficiency* Requirements”
- k. Table 6.8.1-11, “Floor Mounted Air Conditioners and *Condensing Units* Serving *Computer Rooms*”
- l. Table 6.8.1-13, “Commercial Refrigeration—Minimum *Efficiency* Requirements”
- m. Table 6.8.1-14, “Vapor-Compression-Based Indoor Pool Dehumidifiers—Minimum *Efficiency* Requirements”
- n. Table 6.8.1-15, “Electrically Operated *DX-DOAS Units, Single-Package and Remote Condenser, without Energy Recovery*—Minimum *Efficiency* Requirements”
- o. Table 6.8.1-16, “Electrically Operated *DX-DOAS Units, Single-Package and Remote Condenser, with Energy Recovery*—Minimum *Efficiency* Requirements”

- p. Table 6.8.1-17, “Electrically Operated Water Source Heat Pumps—Minimum Efficiency Requirements”
- q Table 6.8.1-18 “Heat Pump and Heat Reclaim Chiller Packages – Minimum Heating Efficiency Requirements”
- r Table 6.8.1-19 Ceiling Mounted Computer Room Air Conditioners – Minimum Efficiency Requirements

Table 6.8.1-11 Floor Mounted Air Conditioners and Condensing Units Serving Computer Rooms—Minimum Efficiency Requirements

Equipment Type	Standard Model	Net Sensible Cooling Capacity	Minimum Net Sensible COP	Rating Conditions Return air (dry bulb/wet bulb)	Test Procedure
Air Cooled	Downflow	<80,000 Btu/h	2.70	85°F/52°F (Class 2)	AHRI 1360
		≥80,000 and <295,000 Btu/h	2.58		
		≥295,000 Btu/h	2.36		
	Upflow - Ducted	<80,000 Btu/h	2.67		
		≥80,000 and <295,000 Btu/h	2.55		
		≥295,000 Btu/h	2.33		
	Upflow - Non Ducted	<65,000 Btu/h	2.16	75°F/52°F (Class 1)	
		≥65,000 and <240,000 Btu/h	2.04		
		≥240,000 Btu/h	1.89		
	Horizontal	<65,000 Btu/h	2.65	95°F/52°F (Class 3)	
		≥65,000 and <240,000 Btu/h	2.55		
		≥240,000 Btu/h	2.47		
Air Cooled with Fluid Economizer	Downflow	<80,000 Btu/h	2.70	85°F/52°F (Class 2)	AHRI 1360
		≥80,000 and <295,000 Btu/h	2.58		
		≥295,000 Btu/h	2.36		
	Upflow - Ducted	<80,000 Btu/h	2.67		
		≥80,000 and <295,000 Btu/h	2.55		
		≥295,000 Btu/h	2.33		
	Upflow - Non Ducted	<65,000 Btu/h	2.09	75°F/52°F (Class 1)	
		≥65,000 and <240,000 Btu/h	1.99		
		≥240,000 Btu/h	1.81		
	Horizontal	<65,000 Btu/h	2.65	95°F/52°F (Class 3)	
		≥65,000 and <240,000 Btu/h	2.55		
		≥240,000 Btu/h	2.47		
Water Cooled	Downflow	<80,000 Btu/h	2.82	85°F/52°F (Class 2)	AHRI 1360
		≥80,000 and <295,000 Btu/h	2.73		
		≥295,000 Btu/h	2.67		
	Upflow - Ducted	<80,000 Btu/h	2.79		
		≥80,000 and <295,000 Btu/h	2.70		
		≥295,000 Btu/h	2.64		
	Upflow - Non Ducted	<65,000 Btu/h	2.43	75°F/52°F (Class 1)	
		≥65,000 and <240,000 Btu/h	2.32		

	Horizontal	≥240,000 Btu/h	2.20	95°F/52°F (Class 3)	
		<65,000 Btu/h	2.79		
		≥65,000 and <240,000 Btu/h	2.68		
		≥240,000 Btu/h	2.60		
Water Cooled with Fluid Economizer	Downflow	<80,000 Btu/h	2.77	85°F/52°F (Class 2)	AHRI 1360
		≥80,000 and <295,000 Btu/h	2.68		
		≥295,000 Btu/h	2.61		
	Upflow - Ducted	<80,000 Btu/h	2.74		
		≥80,000 and <295,000 Btu/h	2.65		
		≥295,000 Btu/h	2.58		
	Upflow - Non Ducted	<65,000 Btu/h	2.35	75°F/52°F (Class 1)	
		≥65,000 and <240,000 Btu/h	2.24		
		≥240,000 Btu/h	2.12		
	Horizontal	<65,000 Btu/h	2.71	95°F/52°F (Class 3)	
		≥65,000 and <240,000 Btu/h	2.60		
		≥240,000 Btu/h	2.54		
Glycol Cooled	Downflow	<80,000 Btu/h	2.56	85°F/52°F (Class 2)	AHRI 1360
		≥80,000 and <295,000 Btu/h	2.24		
		≥295,000 Btu/h	2.21		
	Upflow - Ducted	<80,000 Btu/h	2.53		
		≥80,000 and <295,000 Btu/h	2.21		
		≥295,000 Btu/h	2.18		
	Upflow - Non Ducted	<65,000 Btu/h	2.08	75°F/52°F (Class 1)	
		≥65,000 and <240,000 Btu/h	1.90		
		≥240,000 Btu/h	1.81		
Horizontal	<65,000 Btu/h	2.48	95°F/52°F (Class 3)		
	≥65,000 and <240,000 Btu/h	2.18			
	≥240,000 Btu/h	2.18			
Glycol Cooled with Fluid Economizer	Downflow	<80,000 Btu/h	2.51	85°F/52°F (Class 2)	AHRI 1360
		≥80,000 and <295,000 Btu/h	2.19		
		≥295,000 Btu/h	2.15		
	Upflow - Ducted	<80,000 Btu/h	2.48		
		≥80,000 and <295,000 Btu/h	2.16		
		≥295,000 Btu/h	2.12		
	Upflow - Non Ducted	<65,000 Btu/h	2.00	75°F/52°F (Class 1)	
		≥65,000 and <240,000 Btu/h	1.82		
Horizontal	≥240,000 Btu/h	1.73	95°F/52°F (Class 3)		
	<65,000 Btu/h	2.44			

		≥65,000 and <240,000 Btu/h	2.10		
		≥240,000 Btu/h	2.10		

Table 6.8.1-19 Ceiling Mounted Computer Room Air Conditioners —Minimum Efficiency Requirements

<i>Equipment Type</i>	<i>Standard Model</i>	<i>Net Sensible Cooling Capacity</i>	<i>Minimum Net Sensible COP</i>	<i>Rating Conditions Return air (dry bulb/wet bulb)</i>	<i>Test Procedure</i>
Air Cooled with Free Air Discharge Condenser	Ducted	<29,000 Btu/h	2.05	75°F/52°F (Class 1)	AHRI 1360
		≥29,000 and <65,000 Btu/h	2.02		
		≥65,000 Btu/h	1.92		
	Nonducted	<29,000 Btu/h	2.08		
		≥29,000 and <65,000 Btu/h	2.05		
		≥65,000 Btu/h	1.94		
Air Cooled with Free Air Discharge Condenser with fluid economizer	Ducted	<29,000 Btu/h	2.01	75°F/52°F (Class 1)	AHRI 1360
		≥29,000 and <65,000 Btu/h	1.97		
		≥65,000 Btu/h	1.87		
	Nonducted	<29,000 Btu/h	2.04		
		≥29,000 and <65,000 Btu/h	2.00		
		≥65,000 Btu/h	1.89		
Air Cooled with Ducted Condenser	Ducted	<29,000 Btu/h	1.86	75°F/52°F (Class 1)	AHRI 1360
		≥29,000 and <65,000 Btu/h	1.83		
		≥65,000 Btu/h	1.73		
	Nonducted	<29,000 Btu/h	1.89		
		≥29,000 and <65,000 Btu/h	1.86		
		≥65,000 Btu/h	1.75		
Air Cooled with Fluid Economizer and Ducted Condenser	Ducted	<29,000 Btu/h	1.82	75°F/52°F (Class 1)	AHRI 1360
		≥29,000 and <65,000 Btu/h	1.78		
		≥65,000 Btu/h	1.68		
	Nonducted	<29,000 Btu/h	1.85		
		≥29,000 and <65,000 Btu/h	1.81		
		≥65,000 Btu/h	1.70		
Water Cooled	Ducted	<29,000 Btu/h	2.38	75°F/52°F (Class 1)	AHRI 1360
		≥29,000 and <65,000 Btu/h	2.28		
		≥65,000 Btu/h	2.18		
	Nonducted	<29,000 Btu/h	2.41		
		≥29,000 and <65,000 Btu/h	2.31		
		≥65,000 Btu/h	2.20		
Water Cooled with Fluid Economizer	Ducted	<29,000 Btu/h	2.33	75°F/52°F (Class 1)	AHRI 1360
		≥29,000 and <65,000 Btu/h	2.23		
		≥65,000 Btu/h	2.13		

	Nonducted	<29,000 Btu/h	2.36		
		≥29,000 and <65,000 Btu/h	2.26		
		≥65,000 Btu/h	2.16		
Glycol Cooled	Ducted	<29,000 Btu/h	1.97	75°F/52°F (Class 1)	AHRI 1360
		≥29,000 and <65,000 Btu/h	1.93		
		≥65,000 Btu/h	1.78		
	Nonducted	<29,000 Btu/h	2.00		
		≥29,000 and <65,000 Btu/h	1.98		
		≥65,000 Btu/h	1.81		
Glycol Cooled with Fluid Economizer	Ducted	<29,000 Btu/h	1.92	75°F/52°F (Class 1)	AHRI 1360
		≥29,000 and <65,000 Btu/h	1.88		
		≥65,000 Btu/h	1.73		
	Nonducted	<29,000 Btu/h	1.95		
		≥29,000 and <65,000 Btu/h	1.93		
		≥65,000 Btu/h	1.76		