ADDENDA

ANSI/ASHRAE/IES Addendum q to
ANSI/ASHRAE/IES Standard 90.1-2022

Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings

Approved by ASHRAE and the American National Standards Institute on February 29, 2024, and by the Illuminating Engineering Society on January 26, 2024.

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 (www.ashrae.org/continuous-maintenance).

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FOREWORD

Addendum q adds pad-type (wetted media) adiabatic fluid coolers along with a minimum efficiency and the recently published CTI acceptance test code to Table 6.8.1-7, "Heat Rejection Equipment." A definition for pad-type adiabatic fluid coolers is also added to Section 3 for clarity, and the new CTI ATC-105 Adiabatic *is added to Section 13, "Normative References." This proposal was developed and submitted by ASHRAE TC8.6 Subcommittee on Codes and Standards, which unanimously supports this addition to the Standard.*

Adiabatic fluid coolers consist of a heat exchanger, typically in the form of a coil comprising tubes creating a closed fluid circuit; an air moving device; an integral adiabatic air-precooling system (such as wet media or pads); and a structure. In adiabatic operation, heat flows from the hot process fluid in the closed circuit(s) through the tube wall of the heat exchanger to the airstream that has been precooled by the adiabatic system. Note that both the wet bulb and dry bulb of the entering air must be specified to define the performance of the unit operating in adiabatic mode (unlike cooling towers, which are only dependent on the wet bulb of the entering air or dry coolers, which are only dependent on the dry bulb of the entering air). Footnote "e' was modified to clarify when minimum efficiency requirements are applicable to hybrid wet/dry cooling towers.

The unit airstream is circulated by an air moving device, in this case, an axial or propeller fan. The heat exchanger may include internal enhancements and/or external fins that are in direct contact with the tube wall to improve heat transfer rates. While the air is adiabatically precooled with water running over the wet media, the entire external surface of the heat exchanger remains dry, and as such, the heat transfer process for adiabatic coolers is strictly sensible cooling. The acceptance test standard does not cover adiabatic systems attached to a dry fluid cooler after purchase or supplied by anyone other than the original equipment manufacturer.

As there currently are no performance requirements for adiabatic fluid coolers, this addendum provides a minimum efficiency along with a test code to confirm the thermal performance of pad-type adiabatic fluid coolers. Based on this, no cost impact is anticipated at this time, but compliance with industry performance expectations will improve relative to adiabatic fluid coolers. Note that the Cooling Technology Institute is currently working on extending its thermal certification program to include adiabatic fluid coolers. Finally, adiabatic systems that result in a wetted heat exchange surface are outside of the scope of this test code and should be evaluated as closed-circuit fluid coolers.

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

Addendum q to Standard 90.1-2022

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

adiabatic fluid coolers, integral pad-type: a heat-rejection device consisting of a heat exchanger, an air moving device, integral pad-type adiabatic air-cooling system, and a structure. Water to the pads can be supplied as once-through or recirculated by a spray pump. Adiabatic heat-rejection devices with spray systems and no wetted media are not included in this definition, nor are adiabatic cooling systems field installed on the unit and supplied by anyone other than the manufacturer of the unit.

Update Section 6.5.5 as shown (I-P and SI).

6.5.5 Heat-Rejection Equipment

6.5.5.1 General. Section 6.5.5 applies to heat-rejection *equipment* used in comfort cooling systems, such as air-cooled condensers, dry coolers, adiabatic fluid coolers, open-circuit cooling towers, closed-circuit cooling towers, and evaporative condensers.

[. . .]

Update Table 6.8.1-7 as shown (all other rows and footnotes are unchanged) (I-P).

Table 6.8.7-1 Performance Requirements for Heat Rejection Equipment—Minimum Efficiency Requirements

Equipment Type	Total System Heat-Rejection Capacity at Rated Conditions	Subcategory or Rating Condition[h]	Performance Required [a,b,c,f,g,i]	Test Procedure [d,e]
[. . .]				
Propeller or axial fan *adiabatic fluid coolers, integral pad type*	All	110°F entering water 100°F leaving water 95°F entering db 75°F entering wb	≥6.2 gpm/hp	CTI ATC-105 Adiabatic
[. . .]				

[. . .]

e. The efficiencies and test procedures for both open- and closed-circuit cooling towers are not applicable to hybrid cooling towers that contain a combination of separate wet and dry heat exchange sections that operate simultaneously. The certification requirements do not apply to field-erected cooling towers.

[. . .]

i. For purposes of this table, the adiabatic performance of an *integral pad-type adiabatic fluid cooler* with a once-through pad wetting system is defined as the process water flow rating of the unit at the thermal rating condition listed in Table 6.8.1-7 divided by the fan motor nameplate power. The adiabatic performance of a pad-type adiabatic fluid cooler equipped with a recirculating spray water pump is defined as the process water flow rating of the unit at the thermal rating condition listed in Table 6.8.1-7 divided by the sum of the fan motor nameplate power and the integral spray *pump* motor nameplate power.

Update Table 6.8.1-7 as shown (all other rows and footnotes are unchanged) (SI).

Table 6.8.7-1 Performance Requirements for Heat Rejection Equipment—Minimum Efficiency Requirements

Equipment Type	Total System Heat-Rejection Capacity at Rated Conditions	Subcategory or Rating Condition[h]	Performance Required [a,b,c,f,g,i]	Test Procedure [d,e]
[. . .]				
Propeller or axial fan *adiabatic fluid coolers, integral pad type*	All	43.3°C entering water 37.8°C leaving water 35.0°C entering db 23.9°F entering wb	≥0.52 L/(s·*kW*)	CTI ATC-105 Adiabatic
[. . .]				

[. . .]

e. The efficiencies and test procedures for both open- and closed-circuit cooling towers are not applicable to hybrid cooling towers that contain a combination of separate wet and dry heat exchange sections that operate simultaneously. The certification requirements do not apply to field-erected cooling towers.

[. . .]

i. For purposes of this table, the adiabatic performance of an *integral pad-type adiabatic fluid cooler* with a once through pad wetting system is defined as the process water flow rating of the unit at the thermal rating condition listed in Table 6.8.1-7 divided by the fan motor nameplate power. The adiabatic performance of a pad-type adiabatic fluid cooler equipped with a recirculating spray water pump is defined as the process water flow rating of the unit at the thermal rating condition listed in Table 6.8.1-7 divided by the sum of the fan motor nameplate power and the integral spray *pump* motor nameplate power.

Update Section 13, "Normative References," to add the adiabatic supplement to CTI ATC-105 (I-P and SI).

Reference		Section
[. . .]		
Cooling Technology Institute (CTI) **3845 Cypress Creek Parkway, Suite 420, Houston, TX 77068; P.O. Box 681807, Houston, TX 77268**		
[. . .]		
CTI ATC-105 Adiabatic (23)	Acceptance Test Code for Adiabatic Fluid Coolers	Table 6.8.1-7
[. . .]		

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

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.

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.

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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2/24