

ANSI/ASHRAE/ACCA Standard 180-2008

# ASHRAE/ACCA STANDARD

## Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems

Approved by the ASHRAE Standards Committee on January 19, 2008; by the ASHRAE Board of Directors on January 23, 2008; by Air Conditioning Contractors of America on February 3, 2008; and by the American National Standards Institute on July 4, 2008.

This standard is under continuous maintenance 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. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE Web site, <http://www.ashrae.org>, or in paper form from the Manager of Standards.

The latest copies may be purchased from ASHRAE or ACCA. From ASHRAE at [www.ashrae.org](http://www.ashrae.org), by emailing [orders@ashrae.org](mailto:orders@ashrae.org), by faxing 404-321-5478, or by calling Customer Service at 404-636-8400 (worldwide) or toll free at 1-800-527-4723 (for orders in US and Canada). From ACCA at [www.acca.org](http://www.acca.org), by faxing 703-575-4449, or by calling 703-575-4477.

© Copyright 2008 ASHRAE and ACCA.



[www.ansi.org](http://www.ansi.org)

ISSN 1041-2336



**American Society of Heating, Refrigerating  
and Air-Conditioning Engineers, Inc.**

1791 Tullie Circle NE, Atlanta, GA 30329 [www.ashrae.org](http://www.ashrae.org)



**Air Conditioning Contractors of America**  
2800 Shirlington Rd., Ste 300, Arlington, VA 22206 [www.acca.org](http://www.acca.org)

**ASHRAE Standing Standard Project Committee 180**

**Cognizant TCs: TC 7.3, Operation and Maintenance Management, TC 2.4, Particulate Air Contaminants and Particulate-Contaminant Removal Equipment, and TC 9.8, Large Building Air-Conditioning Applications**

**SPLS Liaison: Carol E. Marriott**

Robert G. Baker, *Chair\**  
Thomas L. Paxson, *Vice-Chair\**  
Cecily M. Grzywacz, *Secretary\**  
Kim E. Anderson  
Mark M. Anderson  
Robert E. Axelrod\*  
David H. Boehm  
Andrew K. Burkhart  
Thomas R. Coker  
Charles E. Dale-Derks\*  
Richard A. Danks\*  
Stanley D. Davis, Jr.  
Calvin William Elswick\*  
Ellis G. Guiles, Jr.\*  
Richard D. Hermans  
John M. Hodgson

Glenn C. Hourahan\*  
Michael J. Hubbard  
S. Louis Kelter\*  
Robert J. Kroohs  
Carl N. Lawson\*  
Michael F. Mamayek\*  
Phil Maybee  
Scott E. Mayes  
Ross D. Montgomery  
Siroos Mostaghimi\*  
Ray J. Murphy\*  
Richard Namovich  
Marc Newman\*  
Stephen W. Nicholas\*  
Lawrence H. Ost\*  
Robert J. Roth\*

Lawrence J. Schoen  
Boggarm S. Setty\*  
Charles J. Seyffer\*  
Aaron D. Shultz  
Dennis M. Siano  
Jeffery A. Siegel  
Elia M. Sterling\*  
Linda D. Stetzenbach\*  
Richard L. Waddle  
John D. Warfield  
Stephen Wilson  
John C. Wimer  
Thomas J. Winstel, Jr.\*  
David L. Witham  
Thomas J. Yacobellis\*

*\*Denotes members of voting status when the document was approved for publication*

---

**ASHRAE STANDARDS COMMITTEE 2007–2008**

Stephen D. Kennedy, *Chair*  
Hugh F. Crowther, *Vice-Chair*  
Robert G. Baker  
Michael F. Beda  
Donald L. Brandt  
Steven T. Bushby  
Paul W. Cabot  
Kenneth W. Cooper  
Samuel D. Cummings, Jr.

K. William Dean  
Robert G. Doerr  
Roger L. Hedrick  
Eli P. Howard, III  
Frank E. Jakob  
Nadar R. Jayaraman  
Byron W. Jones  
Jay A. Kohler  
James D. Lutz  
Carol E. Marriott

R. Michael Martin  
Merle F. McBride  
Frank Myers  
H. Michael Newman  
Lawrence J. Schoen  
Bodh R. Subherwal  
Jerry W. White, Jr.  
Bjarne W. Olesen, *BOD ExO*  
Lynn G. Bellenger, *CO*

Claire B. Ramspeck, *Assistant Director of Technology for Standards and Special Projects*

---

**SPECIAL NOTE**

This American National Standard (ANS) is a national voluntary consensus standard developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). *Consensus* is defined by the American National Standards Institute (ANSI), of which ASHRAE is a member and which has approved this standard as an ANS, as "substantial agreement reached by directly and materially affected interest categories. This signifies the concurrence of more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that an effort be made toward their resolution." Compliance with this standard is voluntary until and unless a legal jurisdiction makes compliance mandatory through legislation.

ASHRAE obtains consensus through participation of its national and international members, associated societies, and public review.

ASHRAE Standards are prepared by a Project Committee appointed specifically for the purpose of writing the Standard. The Project Committee Chair and Vice-Chair must be members of ASHRAE; while other committee members may or may not be ASHRAE members, all must be technically qualified in the subject area of the Standard. Every effort is made to balance the concerned interests on all Project Committees.

The Assistant Director of Technology for Standards and Special Projects of ASHRAE should be contacted for:

- interpretation of the contents of this Standard,
- participation in the next review of the Standard,
- offering constructive criticism for improving the Standard, or
- permission to reprint portions of the Standard.

**DISCLAIMER**

ASHRAE uses its best efforts to promulgate Standards and Guidelines for the benefit of the public in light of available information and accepted industry practices. However, ASHRAE does not guarantee, certify, or assure the safety or performance of any products, components, or systems tested, installed, or operated in accordance with ASHRAE's Standards or Guidelines or that any tests conducted under its Standards or Guidelines will be nonhazardous or free from risk.

**ASHRAE INDUSTRIAL ADVERTISING POLICY ON STANDARDS**

ASHRAE Standards and Guidelines are established to assist industry and the public by offering a uniform method of testing for rating purposes, by suggesting safe practices in designing and installing equipment, by providing proper definitions of this equipment, and by providing other information that may serve to guide the industry. The creation of ASHRAE Standards and Guidelines is determined by the need for them, and conformance to them is completely voluntary.

In referring to this Standard or Guideline and in marking of equipment and in advertising, no claim shall be made, either stated or implied, that the product has been approved by ASHRAE.

## CONTENTS

### ANSI/ASHRAE/ACCA Standard 180-2008 Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems

SECTION	PAGE
Foreword .....	2
1 Purpose .....	2
2 Scope .....	2
3 Definitions .....	2
4 Implementation .....	3
5 Required Inspection and Maintenance Tasks .....	4
Table 5-1 Air Distribution Systems .....	5
Table 5-2 Air Handlers .....	6
Table 5-3 Chillers—Absorption .....	7
Table 5-4 Chillers—Air-Cooled .....	7
Table 5-5 Chillers—Water-Cooled .....	8
Table 5-6 Boilers .....	8
Table 5-7 Condensing Units .....	9
Table 5-8 Control Systems .....	9
Table 5-9 Cooling Tower and Evaporative Cooled Devices .....	10
Table 5-10 Dehumidification and Humidification Devices .....	10
Table 5-11 Engines, Micro-Turbines .....	11
Table 5-12 Free-Standing Heating or Cooling Coils .....	11
Table 5-13 Free-Standing Fans (e.g., Exhaust, Transfer, Return) .....	11
Table 5-14 Fan Coils, Hot Water & Steam Unit Heaters .....	12
Table 5-15 Furnaces, Unit Heaters .....	12
Table 5-16 Indoor Section Duct-Free Splits .....	13
Table 5-17 PTAC (Package Terminal Air Conditioners) .....	13
Table 5-18 PTHP (Package Terminal Heat Pumps) .....	14
Table 5-19 Pumps .....	14
Table 5-20 Rooftop Units .....	15
Table 5-21 Steam Distribution Systems .....	16
Table 5-22 Terminal and Control Boxes (e.g., VAV, Fan-Powered, Bypass) .....	16
Table 5-23 HVAC Water Distribution Systems .....	16
Table 5-24 Water Source Heat Pumps .....	17
Informative Appendix A: Sources of Performance Objectives .....	18
Informative Appendix B: Identifying Indicators of Unacceptable Conditions .....	18
Informative Appendix C: Bibliography .....	18

#### NOTE

When addenda, interpretations, or errata to this standard have been approved, they can be downloaded free of charge from the ASHRAE Web site at <http://www.ashrae.org>.

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

## FOREWORD

Standard 180 was created in a collaborative effort between ASHRAE and ACCA, the Air Conditioning Contractors of America. Its intent is to address the often inconsistent practices for inspecting and maintaining HVAC systems in commercial, institutional and other buildings where the public may be exposed to the indoor environment. Current practices in such buildings vary widely today. Many facilities choose to follow rigorous policies that maintain the system in new or nearly new condition. Others either lack policy in this area or have adopted a run-to-failure approach where the system or components of the system are attended to only when there is a failure.

To provide consistency and improve the energy efficiency, thermal comfort and indoor air quality of commercial HVAC systems, a standard practice for their inspection and maintenance is needed. When there is no routine inspection and subsequent adjustment or maintenance of system components, the system is typically found operating outside its optimum performance parameters. When systems are not maintained, they do not continue to provide the level of work they were designed for.

A standard practice is also needed to guide maintenance of HVAC systems because the maintenance information often provided by manufacturers applies only to the discrete components that they provide rather than to the entire system. This document considers the integration of those components and the way they interact as well as each component separately.

For the public good, it is essential that the HVAC systems in all buildings where persons work, visit or reside support a high quality indoor environment. In addition, sustainability mandates that those conditions be maintained in as energy efficient a manner as possible.

This document describes the minimum acceptable level of maintenance for commercial building HVAC systems. Other standards or guidance documents may establish more specific or rigorous requirements that apply to certain buildings. Where applicable, those requirements should be followed or considered (if guidelines).

Much of the information that will be required to prepare the maintenance program that is mandated by this standard can most conveniently be obtained from the building commissioning (re-commissioning or retro-commissioning) documents. Although re-commissioning is not a requirement of this standard, it should be considered where the commissioning data is either unavailable or outdated.

This standard is written in code intended language so it may be referenced or adopted by enforcement authorities as the minimum acceptable level of performance within their jurisdiction.

*NOTE: This standard is specifically focused on the impacts of maintenance on occupant thermal comfort, indoor air quality and energy efficiency. Ancillary maintenance issues related to equipment reliability, equipment robustness and minimizing overall maintenance costs are also appropriate in order to protect the HVAC capital investment and/or minimize system downtime. These issues, however, are outside of the scope of this standard.*

## 1. PURPOSE

The purpose of this standard is to establish minimum HVAC inspection and maintenance requirements that preserve a system's ability to achieve acceptable thermal comfort, energy efficiency, and indoor air quality in commercial buildings.

## 2. SCOPE

**2.1** This standard provides minimum requirements for the HVAC system inspection and maintenance practice in new and existing buildings. Where specifically noted in this standard, different requirements apply.

**2.2** The provisions of this standard do not apply to:

**2.2.1** Single-family houses or multi-family structures of three or fewer stories above grade.

**2.2.2** HVAC equipment and portions of building systems that primarily provide for industrial, manufacturing, or commercial processes.

**2.2.3** Other building HVAC systems or elements of building HVAC systems that this standard specifically identifies.

**2.3** This standard shall not be used to circumvent any safety, health, or environmental requirements.

## 3. DEFINITIONS

Many of the terms used in this standard practice are defined in the ASHRAE *Terminology of Heating, Ventilation, Air-Conditioning, & Refrigeration*. Additional terms used in this standard are defined below:

**basis of design:** a guidance document that stipulates or lists the desired or intended function and performance of the HVAC system. It lists the needs, requirements, flexibility, efficiency, limits, performance, desired condition, etc., of the space served by the HVAC systems, and it is intended to communicate this information from the HVAC System designer to the HVAC Systems Owner to the Operator, or to subsequent Owners and Operators.

**building management system (BMS):** an energy management system relating to the overall operation of the building in which it is installed. It often has additional capabilities, such as equipment monitoring, protection of equipment against power failure, and building security. It may also be a direct digital control (DDC) system where the mode of control uses digital outputs to control processes or elements directly.

**commercial building:** Commercial buildings shall include, but are not limited to, governmental and educational facilities, healthcare and hospitality facilities, institutional buildings,