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## Summary

This 2010 document is the first in a series of documents by Western HVAC Performance Alliance (WHPA) industry volunteers of ASHRAE/ANSI/ACCA Standard 180. More recent WHPA documents provide detailed review and contributions to the Standard.

**Finalized:** February 27, 2010

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## Use of this Document

*This document provides a first review by the Western HVAC Performance Alliance of the 2008 version of ASHRAE/ANSI/ACCA Standard 180 for quality maintenance of commercial HVAC systems.*

*It is based on an official [WHPA Work Product](#) of February 27, 2010, titled “CQM Committee ANSI/ASHRAE/ACCA.” This Work Product was developed by the WHPA Non-Residential Quality Maintenance Committee.*

*This document, and also the WHPA Work Product, may be used in part or whole at no charge. Attribution to the Western HVAC Performance Alliance is requested.*

*We would also ask that you inform the WHPA through [info@performancealliance.org](mailto:info@performancealliance.org) if you have made use of either document, so that we can inform and encourage the hundreds of volunteers who donate their time to providing expert HVAC advice in order to support energy efficiency objectives.*

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## Initial Review of ASHRAE/ANSI/ACCA Standard 180 (2010)

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## 1. Background

The Non-Residential Quality Maintenance Committee of the Western HVAC Performance Alliance appointed a Tasking Subcommittee to complete a detailed review of ASHRAE/ACCA Standard 180-2008 and to make recommendations as to how it might be used in California's Statewide HVAC Program, specifically the Non-Residential Quality Maintenance Sub Program. In addition to determining whether this national standard was suitable for use in California's climatic zones, the Subcommittee was to propose any additions or more specific tasking, details or instructions that might be necessary to "operationalize" the Standard.

Additionally, the Tasking Subcommittee was asked to consider options for and recommend an array of maintenance measures not mentioned in Standard 180 that, if added, could foster a further reduction in HVAC energy consumption and that could be incorporated into a Premium (or Enhanced) Maintenance program.

The Subcommittee was also authorized to address any other details that it determined important to increasing market acceptance of "QM" as called for in the California Long Term Energy Efficiency Strategic Plan and the IOUs' 2010-2012 HVAC Program Implementation Plans.

## 2. Objectives

- 2.1. To achieve consensus around the adoption of ASHRAE/ACCA Standard 180-2008 as the foundation of California's Non-Residential Quality Maintenance program.
- 2.2. To define specific tasking that would, if completed, constitute a Standard-compliant maintenance program.
- 2.3. To recommend specific tasking that would, if added to the tasking above, define a Premium (or Enhanced) maintenance program.
- 2.4. To make known any exceptions or deficiencies that the Subcommittee finds to accepting the ASHRAE/ACCA Standard 180-2008 as a recommended California Quality Maintenance Standard.

## 3. Approach

- 3.1. The Non-Residential Quality Maintenance Committee established a Tasking Subcommittee.
- 3.2. The Non-Residential Committee Chairman, Don Langston, served as Chairman of the tasking Subcommittee.
- 3.3. Members of the Subcommittee were recruited by the Chairman from members of the full Committee based on the following criteria (See Exhibit B):
  - 3.3.1. Interest in serving on the Subcommittee
  - 3.3.2. Possessing strong HVAC service, maintenance, and technical knowledge
- 3.4. The Subcommittee met by conference call one hour per week from December 18, 2009, to February 24, 2010, to work on the goals assigned to it.

## 4. Findings

4.1. The Subcommittee accepted the ASHRAE/ACCA Standard 180-2008 as the correct basis for a recommended use in California's Non-Residential QM Program with the following exception: Standard 180 should be augmented to include economizer maintenance tasking and motor maintenance tasking.

4.2. One goal of the Subcommittee was to add tasking detail to Section 5 of Standard 180. This was not achieved. The Subcommittee concluded that, because of the wide range of equipment covered under the Non-Residential HVAC category--and the relatively long life of that equipment--developing specific tasking that would be appropriate for any and all make or models is simply not achievable in a single document. This is not only due to the amount of information that would be required, but also due to the lack of manufacturer-supplied data necessary (see finding 4.4 below).

4.3. The Subcommittee determined that Section 5 of Standard 180 is silent on some points that the committee believes need to be addressed, specifically economizers and motors.

4.4. The Subcommittee recognized that there is an unacceptable lack of manufacturer-supplied data and information [see Exhibit B] easily and readily available to technicians for use in the field including, but not limited to:

4.4.1. Specific information about the design of the unit:

4.4.1.1. EER or SEER rating

4.4.1.2. Heat pump COP

4.4.1.3. Subcooling goal for TxV units

4.4.1.4. Superheat

4.4.2. Specific information about maintaining the air conditioner:

4.4.2.1. Belt tightness specification

4.4.2.2. Lubrication instructions

4.4.3. Specific information about the refrigeration cycle:

4.4.3.1. Expected performance parameters under the full range of testing conditions

4.4.4. Specific testing instructions for other unit sub-systems:

4.4.4.1. Economizer testing procedures and set-point recommendations

4.4.4.2. Specific procedures for testing and optimizing the gas combustion process

4.5. The Subcommittee recognized that making unit-specific information available to the technician on the job may require the deployment of technologies that are not generally available to the average technician such as:

4.5.1. A database of model-specific information as described in 4.4 above.

4.5.2. Computerized tools that enable calculations and algorithms that are more complex than the technician can perform manually:

4.5.2.1. Estimating the desired operating parameters of various equipment designs under a wide set of operating conditions

4.5.2.2. Parsing out appropriate repair strategies when multiple coincidental faults and installation defects exist

4.6. The Subcommittee concluded that Standard 180 envisions a never-ending process of continual improvement.

4.7. The Subcommittee concluded that Standard 180 designates the building owner as ultimately responsible for meeting the requirements of the Standard.

4.8. The Subcommittee concluded that Standard 180 requires that the frequency of the maintenance tasks for each piece of equipment, be evaluated in an ongoing manner, until the correct frequency of maintenance is determined for that unit.

4.9. The Subcommittee concluded that Standard 180 requires documentation be created by the maintenance contractor to:

4.9.1. Provide evidence of the required testing to determine correct frequency has taken place

4.9.2. Provide evidence of specific requests by the contractor to the owner for authorization to make required repairs and the owner's response.

## 5. Recommendations

5.1. The Subcommittee recommends that ASHRAE/ACCA Standard 180-2008 be adopted as the minimum specification for use in California's Non-Residential QM Program with the following additions: [See Exhibit A]

5.1.1. Economizer maintenance requirements

5.1.2. Indoor blower motor and sheave maintenance requirements

5.1.3. Ductwork integrity, leakage and airflow performance requirements

5.1.4. Basic training in identifying Mold and biological growth and remediation requirements

5.1.5. Effective communication and documentation with Building Owner when health and safety concerns are found during maintenance inspections.

5.2. The Subcommittee recommends that the additions to the Standard called out above (Section 5.1) also be recommended to the ASHRAE/ACCA Standard committee for inclusion in subsequent versions of Standard 180. (NOTE: In response to this recommendation, ACCA's Donald Prather reports that the economizer inspection tasks shown in Exhibit A of this report will be submitted for consideration to the ASHRAE Standard 180 Committee by Standard 180 Committee Member, Glenn Hourahan, ACCA Division VP. According to Prather, some of these recommendations came directly as the result of the work/discussions of the Non-Residential Quality Maintenance Tasking Subcommittee.)

5.3. The Subcommittee recommends that a system be put in place by an appropriate organization to track required documentation as described in Section 4.9 and to determine and certify compliance with the Standard.

5.4. The Subcommittee recommends that the Non-Residential Quality Maintenance Committee call for appropriate technology development and deployment to meet the needs defined in this report.

## **6. Next Steps**

6.1. The Subcommittee intends to next consider maintenance tasking that exceeds the Standard. This tasking will be considered enhanced tasking and will meet the requirements called out in the Program Implementation Plans as “Premium Maintenance.”

**EXHIBIT A**

Recommended additions to be proposed to the ASHRAE Standard 180 Committee by Standard 180 Committee Member, Glenn Hourahan, ACCA Division Vice President

***PROPOSED TABLE 5-25 Economizers***

<b>Inspection/Maintenance Task</b>	<b>Frequency<sup>a</sup></b>
Check conditions of outside air filters; clean and replace as necessary.	Semi-Annually
Check condition setting and operation of outdoor sensor or change over controller. Repair, adjust or replace components to ensure proper operation.	Semi-Annually
Check condition setting and operation of the economizer controller. Repair, adjust, or replace components to ensure proper operation.	Semi-Annually
Check condition setting and operation of the mixed air/discharge sensor or change over controller. Repair, adjust or replace components to ensure proper operation.	Semi-Annually
Check dampers for proper operation, condition, setting and operation. Repair, adjust, lubricate, or replace components to ensure proper operation.	Semi-Annually
Check condition setting and operation of the economizer damper motors. Repair, adjust, lubricate, or replace components to ensure proper operation.	Semi-Annually
Check integrity of all panels on equipment. Replace fasteners as needed to ensure proper integrity and fit/finish of equipment.	Semi-Annually
Check condition and operation of the return air sensor or changeover controller. Repair, adjust, or replace components to ensure proper operation.	Semi-Annually
Visually inspect areas of moisture accumulation for biological growth. If present, clean or disinfect as needed.	Semi-Annually
Lubricate field serviceable Bearings.	Annually
Check condition setting and operation of the freeze Stat. Repair, adjust, or replace components to ensure proper operation.	Annually

**Note a:** Refer to Section 4.2.2.d for procedure to modify frequency.

## EXHIBIT B

Excerpt from the Technology and Diagnostics Advocacy Sub-Program of the IOU Statewide HVAC Program Implementation Plan approved by the CPUC for 2010-2012. These items were recommended from a national HVAC Roundtable held in California in 2006.

2. Technical Review of Refrigerant Charge Diagnostic Tables/Charts. There is an immediate need for manufacturers to review and revise as needed, the current refrigerant cycle tables along with evaporator and condenser performance charts partly in relation to the low ambient item noted above, and also for other reasons including differences in operating pressures in newer higher efficiency vs. older lower efficiency units. The Carrier representative noted that not taking into account the different operating pressures of new higher efficiency units could result in overcharging.

*Sub-Program Benefits:* More accurate diagnostic tools, in this case the foundational metrics for charge diagnostics, leads to more effective performance maintenance of the equipment.

3. Industry Standard Unit Data for Field Service. There is a critical need for manufacturers to provide data labeling via stickers, plates, or potentially an RFID tag, with enhanced data sets such as superheat/subcooling charts for a wide range of conditions (indoor & outdoor dry bulb/wet bulb temperatures), permanently affixed to each unit. Depending on the approach chosen, a standard graphic layout and mounting location should be established industry wide.

*Sub-Program Benefits:* An industry standard approach will help service technicians perform field diagnosis and correction as needed.

4. Minimum FDD Standards. The industry should develop a minimum standard for onboard diagnostics functionality for all units. It could take the form of a universal plug point for all manufacturers with a universal protocol for data requirements, data analysis and data display. A new PIER FDD project will expand these standards to include embedded remote communications capability so as to enable remote diagnostics by service technicians, owner/managers, and utility program operators for QI/QM, M&V, and persistence of savings evaluation requirements.

*Sub-Program Benefits:* An industry standard will help service technicians with diagnosis and repair of operating faults.

5. Industry Standards Sensor Mount Locations. Manufacturers should create a standard or specification for designated sensor mount locations for conducting field diagnostics. Manufacturers should mark appropriate locations for technicians to attach sensors. At least one manufacturer has a product with sensor mounting locations marked. One manufacturer provides a sensor port accessible without requiring the service technician to open the unit for certain service work.

*Sub-Program Benefits:* An industry standard will help service technicians with diagnosis and repair of operating faults.