Comments of the Air Conditioning Contractors of America to the California Energy Commission: Comprehensive Energy Efficiency Program for Existing Buildings – Scoping Report

The Air Conditioning Contractors of America (ACCA) submits these comments on the California Energy Commission Comprehensive Energy Efficiency Program for Existing Buildings – Scoping Report. As the only nationwide association representing the technical, educational, and policy interests of small and large businesses that design, install, and maintain indoor environmental systems, ACCA is ready to work with the California Energy Commission on its plans to improve the energy efficiency of existing buildings so that the state can meet its goals to reduce energy use.

Defining Quality Standards for Energy Efficiency Work

For 50 years, ACCA has provided technical guidance so that industry practitioners can achieve effective HVAC designs for residential and commercial applications: load calculations (ANSI/ACCA 2 Manual J), duct sizing (ANSI/ACCA 1 Manual D), equipment selection (ANSI/ACCA 3 Manual S), and other manuals and guides. These heating and cooling system standards have been the industry cornerstone for decades. However, it was recognized that subpar installation and maintenance practices have been depriving building owners of comfort. Additionally, such field practices may create an unhealthy or unsafe environment for occupants.

Starting in the early 2000’s, ACCA worked with a growing coalition of interested stakeholders to address the problems associated with subpar field practices in equipment installation / service as well as whole house performance improvement. ACCA spearheaded the development of consensus standards that establish the minimum core capabilities and competencies required of indoor environment and energy efficiency professionals. These standards are aimed at fulfilling the needs of homeowners and occupants for whole-house performance: comfortable, healthy, safe, energy-efficient indoor environments. ACCA makes its Quality Standards available to interested parties as free PDF downloads from www.acca.org/quality. Printed copies are also available for purchased parties through the ACCA bookstore.

Quality Homes (QH)
The ANSI/ACCA 12 QH – 2011 Standard (Existing Home Evaluation and Performance Improvement) establishes the minimum criteria by which deficiencies in existing residential buildings are identified, improvement opportunities are assessed, scopes of work are finalized, work is performed, post-work verification is undertaken, and improvement objectives are met. Supporting Appendices detail building auditing procedures, supplemental tasks that enhance the audit, and identify related industry resources.

The standard applies to existing site-constructed or manufactured one- and two-family dwellings and townhouses not more than three stories above grade in height. In ensuring safe and healthy operation, ACCA 12 QH invokes pertinent installation requirements (see ACCA 5 QI and ACCA 9 QIvp), maintenance requirements (see ACCA 4 QM), identifies and recommends corrections to shell / envelope difficulties, and places health and safety as preeminent.

Quality Installation Specification (QI)
The ANSI/ACCA 5 QI – 2010 Standard (HVAC Quality Installation Specification) incorporates OEM instructions, applicable building and energy codes, documentation of system commissioning elements, and customer education. For each QI attribute, specific metrics, tolerances, approved test/measurement procedures, and acceptable documentation are identified for ensuring that unitary HVAC equipment is properly designed and installed for residential and light commercial applications:

Design Aspects:

- Ventilation

Building heat gain/loss load calculations
Proper equipment capacity selection
- Geothermal Ground Loop Design
- Matched systems (splits only)

**Distribution Aspects:**
- Duct leakage
- Airflow balance
- Hydronic balance

**Equipment Installation Aspects:**
- Airflow across the indoor coil
- Water flow through heat exchangers
- Refrigerant charge
- Electrical requirements
- On-rate for gas-fired equipment
- Combustion venting system
- System controls

**System Documentation & Owner Education Aspects:**
- Proper system documentation to the owner
- Owner/operator education

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**Quality Installation Verification Protocols (QIvp)**
The ANSI/ACCA 9 QIvp – 2011 Standard (*Quality Installation Verification Protocols*) establishes the requirements to objectively verify that an HVAC system meets the QI Specification. The verification protocols, along with the QI Specification, provide the framework for program administrators (e.g., trade associations, utilities, OEMs, etc.) to implement a verification program with appropriate field verifications. The document details the requirements, roles, and obligations for participants in an organized effort to ensure that HVAC installations comply with the underlying QI Standard:

**Quality Maintenance (QM)**
Two separate, but similarly-constructed, standards detail the requirements for quality maintenance for HVAC systems in the installed base:

**Residential:** The ANSI/ACCA 4 QM – 2007 Standard (*Maintenance of Residential HVAC Systems*) establishes the minimum inspection requirements for the maintenance of HVAC equipment found in one- and two-family dwellings of three stories or less. It provides checklists for the inspection of typical residential HVAC systems to meet maintenance requirements. These equipment checklists are divided by equipment type and detail minimum visual inspections, performance tests, and measurements. The recommended corrective actions provide adjustments and component cleaning that should return the equipment to good working order.

**Commercial:** The ANSI/ACCA/ASHRAE 180 – 2012 Standard (*Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems*) establishes the 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.

Conducting regularly scheduled inspections, maintenance, and cleaning of HVAC systems prolongs equipment efficiency, promotes healthy clean air, supports lower utility costs, guards against unexpected failures, corrects unsafe operating conditions, and prolongs equipment life. Occupants and the environment benefit.

**Quality Restoration (QR)**
The ANSI/ACCA 6 QR – 2007 Standard (*Restoring the Cleanliness of HVAC Systems*) recognizes that a lack of routine maintenance or catastrophic natural disaster such as flooding may cause excessive soiling and air-side fouling of the HVAC system. In such cases, the HVAC system will require restorative activities beyond those performed in normal
HVAC mechanical maintenance and servicing. This standard details procedures to significantly improve the cleanliness of an HVAC system and return it to a serviceable condition, although not necessarily an “as new” condition.
Exhibit A: Letter of Support from EnergyStar™ Quality Installation Program Manager
IECC Technical Committee:

ENERGY STAR® is a voluntary partnership program that promotes energy efficiency in products, homes, and buildings in an effort to reduce carbon dioxide emissions. When earned, the ENERGY STAR label signifies superior energy efficiency over standard performance. The ENERGY STAR program also strives to improve energy performance in buildings and existing homes that may never achieve the label, but can still realize considerable energy savings. The program is managed by the U.S. Environmental Protection Agency (EPA).

EPA has been labeling high efficiency heating and cooling equipment since 1995. Unfortunately, studies show that more than half of all air conditioners in U.S. homes do not perform to their rated efficiency as a result of poor installation practices. Improper installation of even high efficiency equipment can reduce performance by as much as 30 percent. This affects not only the homeowner’s utility bills, but can also result in a variety of comfort problems, including insufficient dehumidification, and poor air distribution.

To address this problem, ENERGY STAR has developed a strategy for encouraging proper installation of residential heating, ventilation and air conditioning (HVAC) systems called the ENERGY STAR HVAC Quality Installation (QI) Program. This program helps public utilities, state energy offices and other stakeholders go beyond high efficiency product incentives to deliver additional KW and kWh savings by improving installation procedures. The program defines a quality installation using the Air Conditioning Contractors of America’s (ACCA), ANSI recognized, HVAC Quality Installation Standard. EPA uses the Standard because it sets performance tolerances and establishes the minimum requirements for system design, equipment and duct installation. It also outlines minimum documentation requirements for demonstrating compliance, allowing for system verification and better quality assurance.

EPA is also investigating the use of the ACCA QI Standard as a requirement for the ENERGY STAR New Homes program and for its retrofit program, Home Performance with ENERGY STAR.

Regard,

Ted Leopkey
ENERGY STAR HVAC QI National Program Manager

Exhibit B: EnergyStar™ for Qualified New Homes Quality Installation Checklist
ENERGY STAR Qualified Homes
HVAC System Quality Installation Contractor Notes

1. The HVAC System Quality Installation Contractor Checklist is designed to align with the requirements of ASHRAE 62.2-2007 and published addenda and ANSI / ACCA's 5 Qi-2007 protocol, thereby improving the performance of HVAC equipment in new homes when compared to homes built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, or HVAC problems; for instance those caused by a lack of maintenance by the occupants. Therefore, this checklist is not a guarantee of proper ventilation, indoor air quality, or HVAC performance.

This checklist applies to ventilation systems, split air conditioners, unitary air conditioners, air-source/water-source heat pumps up to 65,000 Btu/h and furnaces up to 225,000 Btu/h. All other equipment is exempt.

This checklist shall be provided by the Rater to the HVAC contractor who shall complete one checklist for each system. Upon completion, the HVAC contractor shall return the checklist(s) to the Rater.

This checklist with supporting documents may also be used to demonstrate compliance with Indoor airPLUS specifications 4.1, 4.2, 4.5, 4.6, and 7.1.
Exhibit C: Prerequisite in LEED For Homes Rating System (25 May 2010 draft – pending Public Comment)

EA PREREQUISITE 1 PERFORMANCE OF ENERGY STAR FOR HOMES

Intent

Improve the overall energy performance of a home to lower the building’s greenhouse gas emissions.

Requirements

SINGLE FAMILY & MULTI-FAMILY LOWRISE

Option 1: Performance Pathway

Meet all of the following requirements:

1. Meet the performance requirements of ENERGY STAR for Homes version 3, including all of the following:
   - Successful completion of the thermal enclosure system rater checklist, the HVAC system quality installation rater and contractor checklists, and the water management system builder and rater checklists;
   - Achieve a HERS Index below the ENERGY STAR for Homes version 3 HERS Index Target

2. At least one of the following appliances must be ENERGY STAR qualified and installed in each dwelling unit:
   - Refrigerator
   - Dishwasher
   - Clothes Washer

Note: For buildings that do not have in-unit kitchens or laundry rooms, projects must install ENERGY STAR qualified appliances for all of their refrigerators, dishwashers, or clothes washers in their central kitchen or laundry room.

OR

Option 2: Prescriptive Pathway

Meet all of the following requirements:

1. Meet the prescriptive requirements of ENERGY STAR for Homes version 3, including all of the following:
- Successful completion of the thermal enclosure system rater checklist, the **HVAC system quality installation rater and contractor checklists**, and the water management system builder and rater checklists;
- Meet the requirements of the ENERGY STAR for Homes version 3 Prescriptive Pathway, which includes meeting or exceeding all components of the ENERGY STAR Reference Design.
Exhibit D: Implementation Plan and Timeline from California Long Term Energy Efficiency Strategic Plan

From page 61
Exhibit E: Extract from an Equipment Manufacturer’s 2010 Sales Plan, Dealer Responsibilities
**Sales Plan**

**Program**

**Addendum 2 – Performance Guarantee**

**DATE:** January 1, 2010  
**NO:** SP1029.2  
**DEPARTMENT:** Channel Marketing  
**FILE NO:** 2.1.09

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**I. EFFECTIVE PERIOD:**

January 1, 2010 through December 31, 2010

**II. PURPOSE:** Heating and air conditioning products must be applied and installed properly in order to perform as designed by the manufacturer. In essence, the independent [ ] dealer is completing the manufacturing process when they install [ ] equipment in their customer’s home. The Commissioning Checklist (Exhibit A) described in this sales plan is in fact the final quality control test for the system. The following process is designed to provide the consumer with an additional level of confidence that the [ ] system and installing [ ] dealer will address their comfort needs and deliver the factory rated performance of the HVAC system. This sales plan addendum will detail the elements of 100% Performance Guarantee offered by independent [ ] dealers to homeowners purchasing new complete system(s) for their home.

**III. ELIGIBLE PARTICIPANTS:**

2010 independent [ ] dealers (referred to as “dealers” throughout this sales plan)
B. Dealer Responsibilities

- The dealer must perform a heat gain / heat loss calculation for every system they install and be able to provide evidence that the selected equipment will satisfy the house sensible and latent load requirement at outdoor design temperatures.

- The dealer must also inspect and evaluate the existing ductwork and discuss any deficiencies that could cause comfort issues with the homeowner and note them on the proposal.

- After the [system] system has been installed, the dealer must complete the designated commissioning check list, which is based on the HVAC Quality Installation Specification (ANSI / ACCA Standard 5-2007) (Exhibit C) in either the heating or cooling mode based on the ambient conditions at the time of installation.
  
  - The checklist can be completed in one of two ways
    
    - Electronically with the performance Excel spreadsheet
Exhibit F: Extract from Department of Energy Builders Challenge Program
## II. Space-Conditioning System Installation - Recommended:

Space conditioning system installation meets ACCA Quality Installation Specification.

### Related Standards & Procedures

- **Building America Best Practices**, The U.S. Department of Energy has produced a series of builder's guides that provide instructions for constructing "best practice" homes that help builders achieve high performance homes. The guides can be found at [www.buildingamerica.gov](http://www.buildingamerica.gov).
As you may be aware, ACCA’s Quality Assured (QA) program is an accreditation program for professional HVAC contracting businesses. QA participants satisfy the requirements for the EPA ENERGY STAR Qualified New Homes Program (Version 3).

The QA Program relies upon three elements to promote quality HVAC installations. First, QA participants have written policies and procedures as identified in the ACCA 5 QI Standard to effect quality on a consistent basis in the field. Second, QA participants complete a detailed HVAC system installation checklist as required by the ENERGY STAR Qualified New Homes Program (Version 3). Finally, qualified 3rd party raters validate specific elements of the installation for compliance to the ENERGY STAR Qualified New Homes Program (Version 3) requirements.

Existing Homes Evaluation and Performance Improvement

Building on the successful implementation of the Energy Star New Homes Accreditation program, in the first quarter of 2013 ACCA will be expanding its Quality Assured (QA) Contractor Accreditation program to include the existing home market.

The principal elements will be that HVAC contractors are vetted, system will be installed are per the ANSI/ACCA 12 QH-2011 standard and subject to third party verification, and an ACCA certificate on the installation will be provided.

Permit Compliance

One Need identified in Chapter 7, Compliance and Enforcement, is to “Increase Permit Participation for Alternations Involving Energy Efficiency (HVAC Change-out, Reroofs, Water Heaters, and Window Replacements)” as a method to increase the compliance rate of permit-required projects. One option suggested by the Staff Report would be to “track HVAC equipment serial numbers form the manufacturer or distribution points to actual permit addresses.” The report further posits that “this could be accomplished by a cooperative effort of equipment manufacturers, distributors, and enforcement agencies developing the process and database to track and monitor the equipment.”

ACCA would caution against proposing to track and report HVAC equipment serial numbers along with permit addresses. The administrative burdens on the small business HVAC contractors, along with the potential exposure of confidential business information, will cause many unintended harms to contractors. If the goal is to simplify the compliance process the solution is unlikely to be found by adding recordkeeping and information collection requirements.

HVAC equipment serial number tracking would be a complex undertaking with tremendous potential for “no match” errors. Many factors would have to be considered, including the method contractors would use to provide this information (electronic or paper), whether new software might be required to fulfill the requirements, the frequency that contractors would have to report the information (weekly, monthly, semi-annually), the amount and type of information beyond serial number (customer name and address, make and model number), and how this information would be protected from disclosure. A customer list that shows jobs by address, or even the number of jobs performed in a year, is confidential.
business information to an HVAC contractor and represents the bulk of their goodwill. This information is valuable and should not be exposed to disclosure, whether by accident or due to a security breach.

Before the state implements an HVAC equipment serial number tracking program it must consider these issues very carefully.