ACCA Quality Assured Program
(& the HVAC Quality Installation Standard)

Wes Davis
Director, Quality Assured Program
Air Conditioning Contractors of America
The Air Conditioning Contractors of America (ACCA)

The only nationwide association representing the technical, educational and policy interests of U.S. businesses that design, install and maintain indoor environmental systems.
Antecedents

– National Warm Air Heating and Air Conditioning Assn. (1914)
– Air Conditioning and Refrigeration Contractors of America (1946)
– National Environmental Systems Contractors Assn. (1968)
– Air Conditioning Contractors of America (1969)
Mission Statement

“To assist and enable HVACR contractors to acquire, serve and satisfy their customers.”
Approach

• Contractor Support
• Consumer Assistance
• Government Relations
• Industry Relations
• Technical Expertise
Membership

• About 5,000 Members
• In all 50 States and 12 foreign countries
• 43 Chapters across America
ACCA QA Program

• QA Program Introduction

• QA Program and QI Standard

• QA Program
  – How to get in
  – How to stay in
  – What happens if there are problems

• Conclusion
The Checklist requirements remain true to the QI Standard
Quality Assured (QA)

• Steering Committee of Leading HVAC Contractors

• Developed:
  – QA Elements (ACCA 5 QI Appendix)
  – QA Requirements
  – QA Agreement
  – www.acca.org/qa

• Approved by ACCA's Board of Directors

 HVAC

NEW Homes
ENERGY STAR v.3 and ACCA QA

- ENERGY STAR adopts ACCA 5 QI Standard (free PDF download at www.acca.org/quality)
- Checklist development
- HVAC QI Training and Oversight (HQITO) organization
  - Train HVAC Contractors
  - Certify / Accredit HVAC Contractors
- Market driven approach
ACCA QA Program

• Gaining Recognition:
  – Orientation
  – Application
  – Participation Agreement
  – Review
  – Recognition
ACCA QA Program

• Gaining Recognition:
  – Orientation
    • Overview of Energy Star
    • Overview of Checklists (Contractor and Rater)
    • Overview of the QA Program
    • Training…NOT
  – Application
  – Participation Agreement
  – Review
  – Recognition
ACCA QA Program

Orientation Delivery

– Online
– Instructor Certification
– Bulk orders
ACCA QA Program

Orientation Delivery
– Online

• [www.acca.org/qa](http://www.acca.org/qa)
• Available 24 / 7
• Short exam (10 questions) at the end of each session
• Final exam at the end
• $59 list price ($39 ACCA Member price)
ACCA QA Program

Orientation Delivery

– Instructor Certification

• Potential instructors inform ACCA of their experience
• If accepted, they then sign an instructor agreement
• ACCA provides the PowerPoint presentations (same as those used in online version)
• Student must still pay for and pass the online exam (price is the same)
ACCA QA Program

Orientation Delivery

– Bulk orders may be purchased

• The bulk purchase of QA Program Orientation sessions may be purchased at the ACCA Member rate.
• The bulk purchases in groups of 10 or 20(+) 
• There is a $100 processing fee added to bulk orders of 10 ($150 for orders of 20)
• All sales are final, no refunds. The coupons are non-transferrable to another utility. A coupon that is not used by an employee or HVAC Contractor may be used by another employee or Contractor.
ACCA QA Program

• Gaining Recognition:
  – Orientation
  – Application
    • Name, address, phone number…
    • Business information
      – Licenses
      – Insurance
    • Self-attest to QA Elements
  – Participation Agreement
  – Review
  – Recognition
ACCA QA Program

• Gaining Recognition:
  – Orientation
  – Application (QA Elements)
    • Business Prerequisites
    • Business Operations
    • Training and Certification
    • Consumer Interaction
  – Participation Agreement
  – Review
  – Recognition
ACCA QA Program

• Gaining Recognition:
  – Application: QA Elements
  • Business Prerequisites
    – Licensing or Registration
    – Insurance
    – Code Requirements
    – Refrigerant Certifications, Training Equipment
    – Hazardous Materials Regulations
ACCA QA Program

• Gaining Recognition:
  – Application: QA Elements
  • Business Operations
    – Employment
    – Safety Programs
    – Fleet Management
    – Quality Installation
    – Quality Maintenance
    – Quality Restoration
    – Instrumentation/Measurement Tools
The QI Standard

ACCA Standard 5

STANDARD NUMBER: ANSI/ACCA 5 QI-2007

HVAC Quality Installation Specification
Residential and Commercial Heating, Ventilating, and Air Conditioning (HVAC) Applications

The Air Conditioning Contractors of America Educational Institute (ACCA®) Standards Task Team (STT) develops standards as an American National Standards Institute (ANSI) accredited standards developer (ASD). ACCA develops voluntary standards as outlined in the ACCA Essential Requirements and the ANSI Essential Requirements. ACCA standards are developed by diverse groups of industry volunteers in a climate of openness, consensus building, and lack of dominance (e.g., committee/group/team balance). Essential requirements, standard activities, and documentation can be found in the standards portion of the ACCA website at www.acca.org. Questions, suggestions, and proposed revisions to this standard can be addressed to the attention of the Standards Task Team, ACCA, 2900 Shirlington Road, Suite 300, Arlington, VA 22206.

ACCA Standards are updated on a three-year cycle. The date following the standard number is the year of approval/release by the ACCA STT. The latest copy may be purchased from the ACCA online store at www.acca.org or ordered from the ACCA Technical Publications Office at 703.575.8107. www.acca.org

Free PDF www.acca.org/quality
Quality Installations Elements

**Design Aspects**
- Ventilation
- Load Calc
- Equip Capacity Selection
- Geothermal HP Ground Heat Exchanger
- Matched Systems (ARHI)

**Distribution Aspects**
- Duct Leakage
- Flow Balance (Air or Water)

**Installation Aspects**
- Flow through Heat Exchanger (Air or Water)
- Refrigerant Charge
- Electrical Requirements
- On-rate (fuel-fired)
- Venting
- System Controls

**Doc. / Education Aspects**
- System Documentation
- Owner Education

Well recognized practices that quality contractors embrace when delivering quality installations.
Equipment Design Elements

• Ventilation
• Building heat gain/loss load calculations
  – For NEW buildings/ducts: *Room-by-room* loads
  – For EXISTING buildings/ducts: *Block* loads
Equipment Design Elements

XYZ Air Conditioners – Detailed Cooling Capacities
Model AC-30 with Coil AC-030

<table>
<thead>
<tr>
<th>CFM</th>
<th>EWB (F)</th>
<th>Evaporator Air</th>
<th>Condenser Entering Air Temp – DB (F)</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>85 Capacity</td>
<td>95 Capacity</td>
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<tr>
<td></td>
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<td>Total Sensible</td>
<td>Total Sensible</td>
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<tr>
<td>875</td>
<td>72</td>
<td>34,610 18,190</td>
<td>33,100 17,620</td>
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<td>31,400 22,240</td>
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<td>28,620 26,290</td>
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<td>26,830 25,220</td>
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<td>1000</td>
<td>72</td>
<td>35,250 19,090</td>
<td>33,680 18,900</td>
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<td>67</td>
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<td>63</td>
<td>29,520 22,520</td>
<td>28,020 26,560</td>
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This A/C unit’s capacities vary (from the nominal 30,530 Btu/h) based on the operating conditions inside and outside of the home.
Equipment Design Elements

Geothermal Heat Pumps Ground Heat Exchanger

• Ground heat exchangers designed:
  – The ground interface heat exchanger fluid temperatures [extremes] and flow rates used as the basis for design equipment capacity are within the range specified in OEM guidelines
  – The ground heat exchange design methodology incorporates:
    • building loads and total installed equipment capacity
    • ground heat exchanger type, materials, and geometry
    • soil thermal characteristics
    • climatic characteristics of the project location
Equipment Design Elements

- Matched system *(per AHRI or CEE Directory)*
  - AHRI - www.ahridirectory.org
  - CEE - follow links from www.cee1.org

Certificate of Product Ratings

AHRI Certified Reference Number: 3369333  Date: 11/6/2010

Outdoor Unit Model Number: ABC 3654151
Indoor Unit Model Number: FC2036B
Furnace Model Number: T00060
Manufacturer: ABC Co. UNITARY PRODUCTS GROUP
Trade/Brand name: DLUX SERIES

Manufacturer responsible for the rating of this system combination is ABC Co. UNITARY PRODUCTS GROUP
Rated as follows in accordance with AHRI Standard 210/240-2006 for Unitary Air-Conditioning and Air-Source Heat Pump Equipment and subject to verification of rating accuracy by AHRI-sponsored, independent, third party testing:

- Cooling Capacity (Btu/h): 35,800
- EER Rating (Cooling): 12.00
- SEER Rating (Cooling): 14.50
- Heating Capacity (Btu/h) @ 47 F: 36,000
- Region IV HSPF Rating (Heating): 8.50
- Heating Capacity (Btu/h) @ 17 F: 24,600
Equipment Installation Elements

- Airflow (& H₂O Flow) through the heat exchanger
  - Within ±15% of design / equipment selection
  - Supported by OEM product data
- Refrigerant charge
  - Superheat method: w/in 5ºF
  - Subcooling method: w/in 3ºF
- Voltage/amps/grounding
- On Rate (Combustion)
  - On-rate (w/in 5% of nameplate)
  - Temperature rise
  - Nozzle selection and pump pressure (oil)
  - Combustion analysis OEM
- Venting (comply with code requirements)
- System controls (per OEM recommendations)
Duct Distribution Elements

• Duct leakage
  – NEW residential / commercial buildings:
    • *Ducts located inside conditioned space:* ≤ 10% total leakage
    • *Ducts outside thermal envelope:* ≤ 6% total leakage
    • Or per EnergyStar™ guidance (new homes)
  – EXISTING residential / commercial buildings:
    • ≤ 20% total leakage, or
    • 50% reduction of existing airflow leakage
  – Or per local code requirement (if meet/exceed above)
Duct Distribution Elements

• Airflow (& H₂O Flow) balance
  – For new or modified ducts: Room airflow is the greater of:
    • Residential: ±20% or ±25 CFM of design / application requirements
    • Commercial: ±10% or ±25 CFM of design / application requirements
  – Unmodified existing ducts: No requirements
System Documentation & Owner Education Elements

- Placing copies of required system documentation with the customer:
  - Calculations
  - Measurements
  - Other records from Acceptable Documentation

- Owner / operator education on pertinent operation, maintenance, and warranty issues.
ACCA QA Program

• Gaining Recognition:
  – Application: QA Elements

• Business Operations
  – Employment
  – Safety Programs
  – Fleet Management
  – Quality Installation
  – Quality Maintenance
  – Quality Restoration
  – Instrumentation/Measurement Tools
ACCA QA Program

- **Gaining Recognition:**
  - Application: QA Elements
- **Training and Certification**
  - Continuing Education (6 hours / 12 hours)
  - Certification
ACCA QA Program

• Gaining Recognition:
  – Application: QA Elements

• Consumer Interaction
  – Interactions with Building Owners and Homeowners
  – Warranties
  – Service Agreements
ACCA QA Program

- Gaining Recognition:
  - Orientation
  - Application
  - Participation Agreement
    - Contractual
    - Spells out requirements
    - Outlines duties and responsibilities
  - Review
  - Recognition
ACCA QA Program

- Gaining Recognition:
  - Orientation
  - Application
  - Participation Agreement
  - Review – About 3-4 weeks
  - Recognition: Posted on QA Directory (www.acca.org/qa)
Maintaining Recognition

HVAC Contractor

START

QA Participant installs HVAC system

QA Participant corrects deficiencies (§3.3.3.2)

- Completes Contractor Checklist
- Submits checklist to Rater
  [EH: Coordinates for Rater (per Quality sampling protocols)]

Yes

Rater validates HVAC system installation (§3.3.2)

- Completes Rater Checklist
- Notifies QA Participant of any noted corrective actions

No

Participant corrects deficiencies?

- Completes/Corrects Contractor Checklist
- Coordinates with Rater for another review

Yes

No

See dispute resolution

HERS Rater

Yes

Rater submits completed checklist(s) to Builder
  [EH: Rater submits completed checklists to Participant]

No

HVAC system install meets requirements?
ACCA QA Program

• Maintaining Recognition:
  – Participants Requirements
  – Third-Party Reports
  – Rater Validation of Installation
  – Compliance Reviews and Site Visits
  – Annual Reevaluation and Renewal
ACCA QA Program

• Maintaining Recognition:
  – Participants Requirements:
    • QA Elements
    • ENERGY STAR Checklists (ACCA 5 QI Standard)
  – Third-Party Reports
  – Rater Validation of Installation
  – Compliance Reviews and Site Visits:
  – Annual Reevaluation and Renewal:
ACCA QA Program

- Maintaining Recognition:
  - Participants Requirements
  - Third-Party Reports
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  - Compliance Reviews and Site Visits
  - Annual Reevaluation and Renewal
ACCA QA Program

• Maintaining Recognition:
  – Participants Requirements
  – Third-Party Reports
  – Rater Validation of Installation
  – Compliance Reviews and Site Visits
  – Annual Reevaluation and Renewal
ACCA QA Program

• Maintaining Recognition:
  – Participants Requirements
  – Third-Party Reports
  – Rater Validation of Installation
  – Compliance Reviews and Site Visits:
    • Administrator Review
    • Provide requested documentation, and/or access to requested information
    • Reasonable access to the QA Program Participant’s office(s) or installation site(s)
    • Failure to comply may result in disciplinary action
  – Annual Reevaluation and Renewal
ACCA QA Program

• Maintaining Recognition:
  – Participants Requirements
  – Third-Party Reports
  – Rater Validation of Installation
  – Compliance Reviews and Site Visits
  – Annual Reevaluation and Renewal
ACCA QA Program

What if...mistakes happen....
Corrective Actions

START
QA Participant installs HVAC system

QA Participant corrects deficiencies (§3.3.3.2)

Participant corrects deficiencies?

Yes

No

Yes

No

QA Participant has dispute with Trade/Builder?

Yes

No

Yes

No

Participant Dispute resolved (Builder’s Policy) (§3.7.2)

No

Participant follows RESNET grievance policy (§3.7.1)

Rater validates HVAC system installation (§3.3.2)

Yes

No

END

Rater installs HVAC system meets requirements?

Yes

END

No

Rater notifies ACCA

Builder hires another QA Participant?

Yes

No

Builder does not seek E-X

No

Yes

ACCA reviews dispute

ACCA implements Corrective Action (§3.4)

Dispute meets Corrective Action?

Yes

No

Provider / RESNET investigates grievance with Rater

Grievance merit resolution?

Yes

No

No

Yes

Provider / RESNET resolves Rater grievance

ACCA reviews dispute

Homebuilder files dispute with ACCA regarding QA Participant (§3.7.4)

ACCA implements Corrective Action (§3.4)

• (§3.4.1) Warning: 1st offense in 365 days:
• (§3.4.2) Probation: 2nd offense 365 days after warning (de-listed 30 days)
• (§3.4.3) Dismissal: Subsequent offense 365 days after probation, dismissed from the program, de-listed, may reapply in 6 months

END
ACCA QA Program

Corrective Actions:

• Review Process:
  – Process of Review:
  – Clarification or Rejection of a Report:
  – Participant Notice and Response.
  – Review of Participant Response:

• Actions Upon Finding of Noncompliance
  – First Notice – Opportunity to Address Deficiency:
  – Second Notice – Probation:
  – Third Notice – Dismissal:
ACCA QA Program

Corrective Actions:

• Review Process:
  – Process of Review:
    • QA Element (including E / S checklists)
    • Passage of time
    • Substantiation
  – Clarification or Rejection of a Report
  – Participant Notice and Response
  – Review of Participant Response
ACCA QA Program

Corrective Actions:

• Review Process:
  – Process of Review
  – Clarification or Rejection of a Report:
    • Additional substantiation
    • 30 Day time limit
    • Can resubmit
  – Participant Notice and Response
  – Review of Participant Response
ACCA QA Program

Corrective Actions:

- **Review Process:**
  - Process of Review
  - Clarification or Rejection of a Report
  - Participant Notice and Response
    - Request a response (30 days)
    - Fully address the report
    - If late, considered an admission of guilt
  - Review of Participant Response
ACCA QA Program

Corrective Actions:

• Review Process:
  – Process of Review
  – Clarification or Rejection of a Report
  – Participant Notice and Response
  – Review of Participant Response
    • If late, issue non-compliance
    • Complaint resolved
    • Complaint un-resolved
ACCA QA Program

Corrective Actions:

• **Review Process:**
  – Process of Review:
  – Clarification or Rejection of a Report:
  – Participant Notice and Response.
  – Review of Participant Response:

• **Actions Upon Finding of Noncompliance**
  – First Notice: Opportunity to Address Deficiency
  – Second Notice – Probation
  – Third Notice – Dismissal
ACCA QA Program

Corrective Actions:

• Actions Upon Finding of Noncompliance
  – First Notice: Opportunity to Address Deficiency
  • Training
  • Tool
  • Policy/Procedure corrected
  • 12 month clock…starts
  – Second Notice – Probation
  – Third Notice – Dismissal
ACCA QA Program

Corrective Actions:

• Actions Upon Finding of Noncompliance
  – First Notice – Opportunity to Address Deficiency
  – Second Notice – Probation
    • Corrective actions taken
    • Off the QA Directory for 30 days
    • 12 month clock…starts
  – Third Notice – Dismissal
ACCA QA Program

Corrective Actions:

• Actions Upon Finding of Noncompliance
  – First Notice – Opportunity to Address Deficiency
  – Second Notice – Probation
  – Third Notice – Dismissal
    • Removal from the program for 6 months (at least)
    • Dependent on corrective actions taken
ACCA QA Program

• Re-application
  – May re-apply after 6 months if:
    • Corrective actions have been implemented and
    • Corrective actions have been reviewed

• Appeals and Dispute Resolution

• Dispute Resolution Outside of the QA Program
Avoiding Disputes with Builders

• Appropriate Contract Language
  – Review your current contracts

• Include a timeline for resolution of issues
  – Installers can make mistakes

• Provide adequate supervision
  – Train, check, train, check, train, check, check
Corrective Actions

START
QA Participant installs HVAC system

QA Participant corrects deficiencies (§3.3.3.2)

Yes

Participant corrects deficiencies

No

Participant has dispute with Trade / Builder?

Yes

Dispute resolved (Builder’s Policy) (§3.7.2)

No

Participant follows RESNET grievance policy (§3.7.1)

Rater validates HVAC system installation (§3.3.2)

Yes

Rater completes Rater Checklist

No

Notifies QA Participant of any noted corrective actions

Builder hires another QA Participant?

Yes

Builder does not seek E-X

No

Provider / RESNET investigates grievance

Yes

Rater resolves Rater grievance

No

Grievance merit resolution?

Yes

ACCA reviews dispute

No

Dispute merits Corrective Action?

Yes

ACCA implements Corrective Action (§3.4)

ACCA disputes dispute

No

Builder files dispute with ACCA?

Yes

Builder files dispute with ACCA

No

ACCA resolves dispute

Yes

ACCA resolves dispute

No

Dispute merits Corrective Action?

Yes

ACCA implements Corrective Action (§3.4)

END

ACCA resolves dispute

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No

Dispute merits Corrective Action?
ACCA QA Program

Rater Checklist (ACCA sought modifications)

- Load calculation
- Equipment sizing
- AHRI Certificate
- Airflow (through heat exchanger)
- Refrigerant charge
- Controls
- Duct leakage
- Balancing
ACCA QA Program

Questions


Answers
ACCA QA Program Overview

Wes Davis
Director, Quality Assured Program
Air Conditioning Contractors of America

www.acca.org/qa
wes.davis@acca.org
(703) 824-8877