



Residential QI/QM Working Group Gaps Report

Goal 2.3-2.4 Workforce Education & Training Committee

A WHPA Report dated January 15, 2014

Background:

The Western HVAC Performance Alliance is a collaboration of the heating, ventilation and air conditioning (HVAC), energy efficiency, facility management, and utility industries and government formed in the state of California in support of the goals of the California Long-Term Energy Efficiency Strategic Plan (CLTEESP).

The CLTEESP sets four goals for the HVAC sector. They are:

- **Goal 1:** Consistent and effective compliance, enforcement, and verification of applicable building and appliance standards.
- **Goal 2:** Quality HVAC installation and maintenance becomes the norm. The marketplace understands and values the performance benefits of quality installation and maintenance.
- **Goal 3:** Building industry design and construction practices that fully integrate building performance to reduce cooling and heating loads.
- **Goal 4:** Develop new hot/dry climate HVAC technologies (equipment and controls, including system diagnostics) and greatly accelerate their marketplace penetration.

Residential QI/QM Working Group:

Much of the significant and detailed work of the Performance Alliance is accomplished through its subject matter-focused Committees as well as functional Working Groups aligned with the CLTEESP. The Workforce Education & Training Committee (WE&T)¹ is responsible for addressing two supporting goals:

- **Strategy 2.3:** Develop and provide expanded Quality Installation/Quality Maintenance Training for contractors, technicians, and sales agents. Conduct comprehensive training needs assessments to identify industry skill gaps between expanded training programs.
- **Strategy 2.4:** Develop and implement comprehensive contractor accreditation programs. (Requested to be assigned to another group on 5/17/11, no further action taken)

To help address the first goal (2.3), the Residential QI/QM Working Group was launched in September 2011. The group met at least twice per month to focus on identifying gaps between the needs of the HVAC workforce with respect to quality installation and quality maintenance and the industry's current education and training practices. The Working Group also worked to identify actionable recommendations to address those gaps. The Working Group reconvened in September and November 2013 to refine the report recommendations following additional feedback from the Parent WE&T Committee. This report summarizes the Residential QI/QM Working Group findings and is organized into six sections, each addressing an identified gap in quality installation and/or quality maintenance:

- **Gap 1:** Ensuring Correct Installation/Maintenance
- **Gap 2:** Training and Support for Installers and Technicians
- **Gap 3:** Increased Air Flow
- **Gap 4:** Refrigerant System Recovery and Evacuation Procedures
- **Gap 5:** Accuracy of Thermometers and Gauges
- **Gap 6:** Low Percentage of Permitted HVAC Work

Committee Chair:

- Sam Hurtado, Sheet Metal Workers Local 105 (as of October, 2013)

¹ All subcommittees were renamed committees in the April 2013 updated WHPA Charter.

- Roger Mason, Chair, Sheet Metal Workers Local 104 (thru September, 2013)

Committee and Contributing Members:

- Warren Lupson, AHRI
- Tiger Adolf and Bill Meehan, BPI
- Barbara Hernesman, CalCERTS
- Tav Commins, California Energy Commission (CEC)
- Nils Strindberg, California Public Utilities Commission (CPUC)
- Max McKinney, EACS Inc.
- Jerry Weiss, HVAC Excellence
- Chris Compton, HVACRedu.net
- Susie Evans, IHACI
- Jeff Gannaway, J.A.G. Consulting
- Rob Falke, NCI
- Mark Cherniack, New Buildings Institute
- Raymond Granderson, Rheem Manufacturing
- Bob Eshom, RMA
- Mark Lowry, RSES
- Ron Mitchell, Bay Area SMACNA
- Pepper Hunziker, Tre'Laine Associates
- Ean Jones and Robert Mowris, Verified Inc.

Driving Question:

What or where are the gaps between where we are today and where we need to be by 2020 and how can we fill those gaps?

Gap 1: Ensuring Correct Installation/Maintenance

- We have a need for installers and technicians to understand and follow recommended service and installation instructions from the manufacturers and/or recommendations from the WHPA WE&T committee.
- Consumers and HVAC technicians need to know how to evaluate that the system has been properly installed and/or maintained. (The ANSI/ACCA Standard QI/QM documents have forms for the customer and technicians as required by the code in Title 24.)

Recommendations

1. Require procedures for Quality Installation per ANSI/ACCA Standard 5 for all newly installed systems. These procedures are to include new construction and new installs in existing buildings.
2. Require procedures for Quality Maintenance per ANSI/ACCA Standard 4. Require all “Tune-ups” that are performed by a C-20 contractor and/or their technicians use these standards.
3. Require all technicians working for a C-20 contractor to use CEC-approved refrigerant charge testing procedures any time the refrigerant is tested.
4. Require proper installation of the filter drier in the liquid line be installed near the evaporator coil to prevent clogging of the TXV or metering device.
5. Require that the evaporator coil, condenser coil, and blower wheel be cleaned before adjusting the refrigerant charge on the air conditioning system.

6. Set up a statewide policy or guideline for inspection of HVAC systems. At this time, codes may be interpreted differently from city to city and some cities may have local codes in addition to the uniform building codes. Building inspectors need to increase their knowledge and understanding of code changes in the HVAC industry.
7. Provide training on standards for building inspectors.
8. Provide consumer education on what is needed to properly install and service an HVAC system.
9. Ensure contractors and technicians are following all manufacturers recommendations for installation, commissioning and operation.

Gap 2: Training and Support for Installers and Technicians

- There is a need to require training, mentoring, and technical support to perform HVAC installation and service work.
- There is a need for training on the correct installation of TXV (thermal expansion valve) sensing bulbs, diagnostics of non-condensable materials, and restrictions in the refrigeration system.

Recommendations

1. Require specific training for workers performing HVAC work. For example, require completion of a state-approved apprenticeship, trade school, community college, or online training program. Classroom instruction needs to be followed by practical hands-on training working with equipment -- in the field, if possible -- or training at a manufacture or distributor site. There is a need for 40-60% hands-on training, in a shop environment and/or in the field.
2. Require all HVAC technicians to be licensed by the State of California with at least one industry recognized technical certification with the goal of standardized technician certification by 2016. Separate licensing would be given in each of the following categories: residential, light commercial, and commercial. THE WORKING GROUP RECOMMENDS that further discussion be held on other potential elements of the licensing, such as years of experience in providing HVAC system service, installation and maintenance.
3. After providing proper documentation of qualification for licensing, a technician will be required to successfully pass a state administered proficiency exam.
4. The State should be required to assemble HVAC Industry Stakeholder groups such as the Western HVAC Performance Alliance, with participation by organizations such as but not limited to ACCA, RSES, SMACNA, HVAC Excellence, IHACI, United Association, Sheet Metal Air Rail and Transportation Workers, etc.
5. Technicians licensed by the State should have 8 hours of continuing education classes annually. These classes will cover advanced technical processes and code compliance updates.
6. If the C-20 license holder is listed as "Sole Owner" and is the technician performing the work, they should be required to re-test every 3 to 5 years, as with the technician exam. Currently, "Sole Owner" C-20 license holders are never required to re-test.
7. The C-20 exam should include questions on proper installation and maintenance procedures. Require continuing education requirements for the license holder to keep up to date with changes in the industry with respect to energy, installation, and service.
8. Require the correct refrigerant charge be verified in the A/C system. It is recommended that the refrigerant charge procedure in Title 24 be reviewed, with further research. Additionally, any time split systems or an air conditioning system is installed and/or the package unit is opened,

whether used for residential or commercial, we recommended that a new liquid line drier be installed.

Gap 3: Increased Air Flow

We have a need to increase and verify the airflow on existing systems, especially on the return-air side of the system.

Recommendations

1. When replacing the furnace or air handler on existing duct systems, require that the return air duct be sized for the correct CFM (cubic feet per minute), per a recognized third party accrediting organization like ANSI, ISO, ASTM, etc.
2. Require that the return air plenum at the furnace or intake grill be at least 18 to 24 inches in length, so as not to restrict the air flow through the equipment and/or filter.

Gap 4: Refrigerant System Recovery and Evacuation Procedures

- We need to make sure that recovery and evacuation (per CEC Title 24) procedures are followed for recovery and evacuation of systems in order to perform proper diagnostics and keep contaminants out of the refrigeration system, per CEC Title 24 and Federal EPA 608.

Recommendations

1. Require that evacuation of refrigerant system be triple evacuated and pulled down to 500 microns and held for 5 to 20 minutes to achieve the correct vacuum. Documentation of properly measured evacuation should be required in the CEC Title 24.
2. Require procedures for proper maintenance and operation on a vacuum pump. Documentation of proper vacuum pump maintenance should be required in CEC Title 24.

Gap 5: Accuracy of Thermometers and Gauges

- There is a need to look into the accuracy of the thermometers and gauges used for taking readings on the refrigeration system. Currently there is no standard for which thermometers or gauges can be used.

Recommendations

1. Develop standards for manufactures to meet the requirements of the California Energy Commission Title 24 Building Energy Efficiency Standards (ASHRAE SPC 41). This will ensure that thermometers and gauges are accurate when manufactured.
2. Thermometers and gauges should be certified for their accuracy for the application for which they are used. THE WORKING GROUP RECOMMENDS that further discussion be held to discuss who should be the certifying body/bodies and to what standards and how often they should be certified.

Gap 6: Low Percentage of Permitted HVAC Work

- Permits are only pulled on 10% of the HVAC systems that are replaced. The number of permits pulled for add-on and replacement systems needs to be increased.

Recommendations

1. Set up a statewide policy or guideline for inspection of HVAC systems. At this time codes may be interpreted differently from city to city and some cities and counties may have local codes in

addition to the uniform mechanical building codes. Building inspectors need to increase their knowledge and understanding of code changes in the HVAC industry.

2. Provide training on standards for building inspectors, contractors, technicians, salespeople, and third party verifiers.
3. Increase customer education on the importance of permitting to support quality installation.
4. Establish permit compliance benchmarks including a timeline for completing the benchmarks in support of statewide compliance goals in accordance with priority Goal #4 “Quantifying Rates of Permit Compliance and Energy Savings Impacts” for the WHPA Council of Advisors.



WHPA Work Product Summary

DATE: December 2, 2013

INITIATING BODY: Goal 2.3 & 2.4 WHPA Workforce Education and Training Committee – Residential QI/QM Working Group

WORK PRODUCT NAME: Goal 2.3 & 2.4 WHPA Residential QI/QM Working Group Gaps Report dated November 18, 2013

TYPE OF ACTION REQUESTED: **VOTE** **GUIDANCE** **OTHER:**

APPROVAL HISTORY

WORKING GROUP: Goal 2.3&2.4 Residential QI/QM

BY CONSENSUS **BY VOTE**

TALLY: Unanimous "Aye", no "Nay" or "Abstain" to escalate to the WHPA WE&T Committee.

DATE: November 18, 2013

COMMITTEE: Goal 2.3&2.4 Workforce Education and Training

BY CONSENSUS **BY VOTE**

TALLY: 12 "Aye", 0"Nay", 0"Abstain" to escalate to the WHPA Executive Committee.

DATE: December 2, 2013

WORK PRODUCT OBJECTIVES: To help address Goal 2.3, the Residential QI/QM Working Group was formed to identify gaps between the needs of the HVAC workforce with respect to quality installation and quality maintenance and the industry's current education and training practices, as well as to identify actionable recommendations to address those gaps. The result is the Western HVAC Performance Alliance Working Group Gaps Report that this Action Request summarizes. Briefly, the gaps identified are:

- Gap 1: Ensuring Correct Installation/Maintenance
- Gap 2: Training and Support for Installers and Technicians
- Gap 3: Increased Air Flow
- Gap 4: Refrigerant System Recovery and Evacuation Procedures
- Gap 5: Accuracy of Thermometers and Gauges
- Gap 6: Low Percentage of Permitted HVAC Work

CA ENERGY EFFICIENCY PLAN STRATEGIC GOAL ALIGNMENT:

GOAL 1 GOAL 2 GOAL 3 GOAL 4

CEESP HVAC GOAL STRATEGIES: CEESP Goal 2: Quality HVAC installation and maintenance becomes the norm. The marketplace understands and values the performance benefits of quality installation and maintenance.

- Strategy 2.3: Develop and provide expanded Quality Installation/Quality Maintenance Training for contractors, technicians, and sales agents. Conduct comprehensive training needs assessments to identify industry skill gaps between expanded training programs.
- Strategy 2.4: Develop and implement comprehensive contractor accreditation programs. (Requested to be assigned to another group on 5/17/11, no further action taken)

BENEFITS: This work product developed within the WHPA addressing Workforce Education & Training "Residential QI/QM" will help inform the HVAC Sector Strategy project. The recommendations would improve energy efficiency by setting statewide guidelines for inspection of HVAC systems, providing training for building inspectors, plus consumer education on what is needed to properly install and service an HVAC system including the importance of permitting, ensuring contractors and technicians follow manufacturer recommendations for installation, commissioning and operation; requiring specific training for workers performing HVAC work, fostering statewide HVAC technician licensing and minimum annual CEU requirements; setting standards for increasing and verifying air flow on existing systems; documentation of properly measured refrigerant system recovery and evacuation procedures; developing manufacturer standards to meet the requirements of ASHRAE SPC 41. The recommendations would also improve the percentage of pulled permits for HVAC system replacements by setting statewide policy/guideline for inspection of HVAC systems, providing standards training for key parties, and establishing permit compliance benchmarks in support of statewide compliance goals in accordance with the WHPA's priority Goal #4 "Quantifying Rates of Permit Compliance and Energy Savings Impacts".

OUTSTANDING ISSUES / DEBATES / MINORITY VIEWS: After rework at the Working Group level, the WE&T Committee unanimously approved escalation of the Residential QI/QM Gaps Report to the WHPA Executive Committee as indicated in the following detailed roll call vote:
AYE (x12): AHRI, ASHRAE, BPI, CalCERTS, CEC, Honeywell ECC (by Proxy), HVAC Excellence, HVACRedu.net, JCEEP,

PIPE Trust Fund, RSES, UA

There were zero NAY and ABSTAIN votes.

POTENTIAL AUDIENCE: Goal 2.3&2.3 WHPA Workforce Education & Training (WE&T) Committee, WHPA Executive Committee, Statewide IOU WE&T Team, HVAC Sector Strategy Committee (not yet formed), WHPA member distributors and manufacturers.

VOTING DECISION: WHPA Executive Committee

5-Part Motion presented by Erik Emblem (JCEEP):

1. That the "Residential QI/QM Gaps Report" dated November 18, 2013 be "Validated" by the Executive Committee.
2. That the EC Action Request Summary be retitled "WHPA Work Product Summary," that it be completed by staff, and that it be joined to the aforementioned "Residential QI/QM Working Group Gaps Report" to become a single document.
3. That the word "Proposed" on the above referenced report's cover page be replaced by the words "A WHPA Report"
4. That the single document described in #2 above be posted at the WHPA website on: (a) the homepage in the "WHPA Work Products" section, and (b) WE&T Committee page listed under "Working Group Reports"
5. That WHPA Staff draft a letter of appreciation from the Executive Committee to members of the Residential QI/QM Group and email it to them.

VOTE TALLY: During the WHPA Executive Committee Vote on January 15, 2014, ACCA, AHRI, ASHRAE, CPUC, HARDI, IHACI, JCEEP, RSES, voted aye. There were no opposed. PG&E, SCE and SDG&E abstained. The motion carried.

FURTHER ACTIONS REQUIRED: Per the accepted motion, WHPA Staff retitled the EC Action Request Summary to "WHPA Work Product Summary" and added the two page document as the cover pages to the following Residential QI/QM Working Group Gaps Report dated November 18, 2013. This single document will be posted at the WHPA website on: (a) the homepage in the "WHPA Work Products" section, and (b) the WE&T Committee page listed under "Working Group Reports". Additionally, WHPA Staff will draft a letter of appreciation from the Executive Committee to members of the Residential QI/QM Working Group and email it to them.

NEXT STEPS: By unanimous agreement on January 15, 2014, the WHPA Executive Committee requested that clarification of the suggested owners associated with each recommendation be provided by the Residential QI/QM Working Group.

Note: WHPA Staff reported that all five WE&T Working Group Gap Reports were forwarded to the statewide WE&T team prior to the January 15, 2014 WHPA Executive Committee meeting.