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## Summary

FDD technologies have much potential to improve HVAC Commercial Quality Maintenance (CQM). This deliverable captures key elements on how FDD can better fit in with the California (and other states) CQM programs. It touches on different strategies for implementation and qualification criteria to consider. This document will be updated.

**Finalized:** January 18, 2017

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## Use of this document

*This document provides information on defining “comparable training” for labor demand strategies.*

*It is based on an official [WHPA Work Product](#) of January 18<sup>th</sup>, 2017 titled “Summary Document: Onboard/In-Field Fault Detection and Diagnostics (FDD) Committee Recommendations, Considerations” This Work Product was developed by the WHPA WE&T Comparable Training Working Group.*

*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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## Benefits

Establishing a standardized set of criteria for FDD technologies for inclusion in the QM programs will allow for greater consistency and ease of use by the maintenance contractors. Many contractors have territories that cross over utility service lines, and limiting the inconsistencies would help encourage them to join more than one program. This should also encourage interest from manufacturers as they will more easily be able to introduce their products into the QM program market. Having a central technology database would also allow for more easily removing products that no longer meet Title 24 and QM program requirements. Having a more globalized perspective on FDD technologies improves the awareness of their different functions and allows for better integration and implementation of innovative products that help CQM activities

FDD technologies have much potential to improve HVAC Commercial Quality Maintenance (CQM). It is important for the California statewide CQM programs to have an improved understanding of the roles FDD can play. This deliverable seeks to capture key elements from the 2016 discussions on how FDD can better fit in with the CA statewide CQM programs. It touches on different strategies for implementation and qualification criteria to

consider. This will be a living document to allow for updates and refinement as needed as the FDD Committee continues to review technologies and program methodologies.

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## Recommendation to Qualify FDD Technologies for Inclusion in Utility Commercial HVAC Programs

### 1. FDD Committee Recommendations / Considerations

- a. Continue to require that the economizer controls replacement measure leverages T-24 certified FDD technologies
- b. WHPA FDD committee should continue to maintain the FDD technology list, and other supporting documentation (research list, fault list)
- c. Consider the merits of two strategies for further incorporating FDD into CQM
  - i. **Create a stand-alone HVAC CQM statewide FDD measures, in addition to the current measures**
    - a. Begin compiling all research that quantifies FDD savings, and start work paper development
    - b. Consider in-field FDD measure
    - c. Consider onboard FDD measure
      - a. Consider additional programmable thermostat with FDD measure
  - ii. **Maintain a qualified FDD product list, let FDD enhance the realization rates of current CQM measures by acting as a “validation tool” for CQM implementers and evaluators**
    - a. The Comprehensive list of HVAC faults should also be maintained and updated as necessary by the WHPA FDD committee. As available, FDD technologies should indicate fault coverage, in a manner consistent with the terms outlined in the fault list.
- d. FDD CQM Qualification criteria
  - i. The FDD technology shall meet the following general definition
    - a. Technologies that assist in identification of performance, maintenance, or repair needs using measurements and software intelligence in an in-field and/or onboard fashion.
  - ii. The FDD technology shall be classified with Type and Subtype clearly identified
    - a. In-field FDD
      - a. FDD products shall meet definition of in-field FDD: FDD technologies that use temporary sensors that reside with HVAC equipment for a short amount of time
      - b. In-field FDD sensors shall be calibrated on a regular basis
      - c. FDD shall indicate fault coverage, in a manner consistent with the Fault List
        - i. FDD shall be capable of determining whether or not any of the statewide CQM measures should be performed on a given HVAC system
    - b. Onboard FDD
      - a. FDD products shall meet definition of onboard FDD: FDD technologies that employ permanent sensors that continually reside with HVAC equipment
      - b. FDD shall indicate fault coverage, in a manner consistent with the Fault List

- i. FDD shall be capable assisting in determining whether or not any of the statewide CQM measures should be performed on a given HVAC system
  - c. Economizer Controls – Replacement measures
    - i. FDD products shall be T-24 certified
  - d. Programmable Thermostat Replacement measure
    - i. Add Wi-Fi-enabled FDD thermostat replacement measure to statewide CQM offerings...
  - e. Where 3<sup>rd</sup> party / Long-term retrofit products are considered, any installation aspects that potentially void factory HVAC warranty need to be indicated (mitigated as possible)
- e. **Demonstrating achievement of FDD CQM Qualification criteria**
  - i. Documentation/literature shall be provided that clearly indicates specified capabilities.

**2. Reference: 2016 California Statewide QM Measures**

- a. Condenser Coil Cleaning – Clean condenser coils on qualifying units.
  - i. On AC with gas heat
  - ii. On AC only
  - iii. On heat pump
  - iv. On VAV AC with gas heat
- b. Economizer Controls – Replace existing economizer control sensor or optimizing existing economizer controls by adjusting the changeover setpoint
  - i. Adjustment vs replacement
  - ii. On AC with gas heat
  - iii. On AC only
  - iv. On heat pump
  - v. On VAV AC with gas heat
- c. Economizer Repair – Restore economizer functionality through repairs
  - i. ADEC vs non-ADEC
  - ii. On AC with gas heat
  - iii. On AC only
  - iv. On heat pump
  - v. On VAV AC with gas heat
- d. Evaporator Coil Cleaning – Clean evaporator coils on qualifying units.
  - i. On AC with gas heat
  - ii. On AC only
  - iii. On heat pump
  - iv. On VAV AC with gas heat
- e. Refrigerant Charge Adjustment – Adjust refrigerant charge to meet manufacturer specifications
  - i. Single stage
  - ii. Multi-stage
  - iii. First stage only vs second/higher stage only vs both
  - iv. On AC w gas heat

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- v. On AC only
  - vi. On heat pump
  - vii. On VAV AC w gas heat
- f. Unoccupied Fan Control – Set supply fan to “Auto” or intermittent during unoccupied periods
- i. On AC w gas heat
  - ii. On AC only
  - iii. On heat pump
  - iv. On VAV AC w gas heat
- g. Airflow Adjustment
- h. Programmable Thermostat – Replace non-programmable thermostat and set supply fan to Auto in unoccupied periods for packaged rooftop HVAC.