Proposal Summary

CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

2022 California Energy Code (Title 24, Part 6)

Single Family Enhanced Air-to-Water Heat Pump Compliance Options

Updated: Thursday, August 29, 2019

Prepared by: Marc Hoeschele, Frontier Energy

Introduction

The document summarizes proposed revisions to the California Energy Code (Title 24, Part 6) that will be discussed during a utility-sponsored stakeholder meeting on October 10, 2019. The Statewide Utility Codes and Standards Enhancement (CASE) Team is seeking input and feedback. To provide your comments, email info@title24stakeholders.com by October 24, 2019.

Measure Description

This measure will evaluate the 2019 Residential Alternative Calculation Method modeling approach for air-to-water heat pumps and to utilize recently available field data to better characterize performance and accommodate emerging strategies for these products. Air-to-water heat pumps are currently not a mainstream HVAC technology in the California residential market due to a variety of market factors and a historical reliance on widely available natural gas for space and water heating.

All-electric space conditioning is an emerging area of interest as the state is moving towards an increasingly decarbonized future and many energy efficiency advocates are promoting all-electric solutions for the residential market. This effort will include the following submeasures:

AWHP and Three Function Heat Pump Modeling

Improving the performance characterization for both air-to-water heat pumps and three function heat pumps (heat pumps which provide water heating as well as space conditioning) within the 2019 Residential Alternative Calculation Method. The current plan is to differentiate performance between fixed speed and variable speed AWHP equipment.

Hydronic Radiant Delivery

Incorporate radiant ceiling panels as an alternative recognized hydronic distribution system option.

Draft Code Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2019 documents are marked with red underlining (new language) and ~~strikethroughs~~ (deletions). Expected sections or tables of the proposed code (but not specific changes at this time) are highlighted in yellow.

Standards

As this is a compliance option, no changes to the standards are planned.

Reference Appendices

HERS field verification changes to the reference appendices are being considered, but are not being proposed at this time.

Proposal Summary

2022 California Energy Code (Title 24, Part 6)

Compliance Requirements for Residential HVAC Fault Detection and Diagnostics

Last updated: August 9, 2019

Prepared by: Kristin Heinemeier, Frontier Energy

Introduction

The document summarizes proposed revisions to the California Energy Code (Title 24, Part 6) that will be discussed during a utility-sponsored stakeholder meeting on October 10, 2019. The Statewide Utility Codes and Standards Enhancement (CASE) Team is seeking input and feedback. To provide your comments, email info@title24stakeholders.com by October 24, 2019.

Measure Description

The focus of the Residential Fault Detection and Diagnostics (FDD) measure is to provide credit for use of advanced technologies that detect when residential HVAC systems are installed and operated optimally. The Statewide CASE Team is proposing a compliance credit that will be granted for installation of FDD devices that can identify over time when an HVAC system's performance is not optimal (due to installation faults or faults that emerge over time) and alert the owners or service providers. Credit may be provided in a way similar to the refrigerant and airflow verification credit—Section 2.4 of the 2016 Title 24, Part 6 Residential ACM Reference Manual describes credit given to systems for which the charge is verified as correct by establishing a "compressor efficiency multiplier," which is used in calculations to degrade the efficiency of a compressor by a factor of 10 percent when charge is not verified as correct, but only by 4 percent when it is verified as correct. In this case, an efficiency multiplier may be used to provide credit for installation and proper configuration of an FDD device or FDD-enabled HVAC system. In this effort, the Statewide CASE Team is conducting field research to identify the appropriate efficiency multiplier for systems with and without an FDD device, and also providing performance-based specifications for manufacturer certification of FDD effectiveness and field verification of proper FDD installation.

Draft Code Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2019 documents are marked with red underlining (new language) and ~~strikethroughs~~ (deletions).

RA3.4.5 RESIDENTIAL HVAC FDD VERIFICATION PROCEDURES

RA3.4.5.1Construction Inspection

(new requirements)

RA3.4.5.2Functional Testing

(new requirements)

JA6.4 RESIDENTIAL HVAC FDD CERTIFICATION SUBMITTAL REQUIREMENTS

(new requirements)

ACM 2.4.5.1 VERIFIED REFRIGERANT CHARGE OR FAULT INDICATOR DISPLAY

Proper refrigerant charge is necessary for electrically driven compressor air-conditioning systems to operate at full capacity and efficiency, and ongoing verification is needed to keep it operating at full capacity and efficiency. Software calculations set the compressor efficiency multiplier to ~~0.90 to account for the effect of improper refrigerant charge or 0.96 for proper charge.~~:

- 0.90 when there is no initial verification and no ongoing FDD; or
- 0.96 when there is initial verification but no ongoing FDD; or
- XXX when there is ongoing FDD but no initial verification; or
- XXX when there is both initial verification and ongoing FDD.

PROPOSED DESIGN

The software allows the user to indicate if systems will have diagnostically tested refrigerant charge or a field-verified fault indicator display (FID). This applies only to ducted split systems and packaged air conditioners and heat pumps.

STANDARD DESIGN

The standard design building is modeled with either diagnostically tested refrigerant charge or a field-verified FID if the building is in climate zone 2 or 8-15, and refrigerant charge verification is required by Section 150.1(c) and Table 150.1-A or 150.1-B for the proposed cooling system type.

Table 10: Summary of Space Conditioning Measures Requiring Verification

Measure	Description	Procedures
Verified Refrigerant Charge	Air-cooled air conditioners and air-source heat pumps must be tested diagnostically to verify that the system has the correct refrigerant charge. The system must also meet the system airflow requirement.	RA1.2, RA3.2
Verified Fault Indicator Display	A Fault Indicator Display can be installed as an alternative to refrigerant charge testing.	RA3.4.2
Verified Residential HVAC FDD		

Proposal Summary

2022 California Energy Code (Title 24, Part 6)

Compliance Requirements for Variable Capacity Cooling Systems

Last updated: August 6, 2019

Prepared by: David Springer, Frontier Energy & Curtis Harrington, WCEC

Introduction

The document summarizes proposed revisions to the California Energy Code (Title 24, Part 6) that will be discussed during a utility-sponsored stakeholder meeting on October 10, 2019. The Statewide Utility Codes and Standards Enhancement (CASE) Team is seeking input and feedback. To provide your comments, email info@title24stakeholders.com by October 24, 2019.

Measure Description

This measure will improve compliance modeling of duct performance for two-speed or variable speed split system HVAC systems (excluding mini- and multi-split systems) unless ducts are located inside conditioned space, or if systems utilize qualified zone controls. Variable capacity split system air conditioners and heat pumps typically have significantly higher SEER and EER ratings than single speed equipment. Current compliance calculations allow full credit for the higher ratings, yet research conducted by the UC Davis Western Cooling Efficiency Center (WCEC) has shown that reduced air velocity in ducting significantly degrades cooling performance when ducts are in hot attics. "Qualified zone controls" are those that modulate compressor and fan speed based on the number of zones calling. As proposed, modifications to CBECC-Res will account for reduced distribution airflow and will be calibrated and verified using the WCEC's laboratory test data and simulation model.

Draft Code Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2019 documents are marked with red underlining (new language) and ~~strikethroughs~~ (deletions).

SUBCHAPTER 8
LOW-RISE RESIDENTIAL BUILDINGS – PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES

SECTION 150.1 – PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES FOR LOW-RISE RESIDENTIAL BUILDNGS

(b) Performance Standards. A building complies with the performance standards if the energy consumption calculated for the Proposed Design Building is no greater than the energy budget calculated for the Standard Design

Building using Commission-certified compliance software as specified by the Alternative Calculation Methods Approval Manual.

3. Compliance Demonstration Requirements for Performance Standards.

B. **Field Verification**. When performance of installed features, materials, components, manufactured devices or systems above the minimum specified in Section 150.1(c) is necessary for the building to comply with Section 150.1(b), or is necessary to achieve a more stringent local ordinance, field verification shall be performed in accordance with the applicable requirements in the following subsections, and the results of the verification(s) shall be documented on applicable Certificates of Installation pursuant to Section 10-103(a)3 and applicable Certificates of Verification pursuant to Section 10-103(a)5.

x. **Multispeed and Variable Speed Systems**. When performance compliance requires multispeed or variable speed systems and zone controls are installed as specified in Section 150.0(m)13C, the zone controls shall be field verified in accordance with the procedures specified in Residential Appendix RA3.4.5.

Residential Appendix RA3

RA3.4 *Field Verification of Installed HVAC System Components and Devices*

RA3.4.5 *Verification of Zone Controls for Multi-Speed and Variable Speed HVAC Systems*

[To be developed.]