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2022 Pre-Rulemaking for Building Energy Efficiency Standards

Payam Bozorgchami, P.E.

September 10, 2020

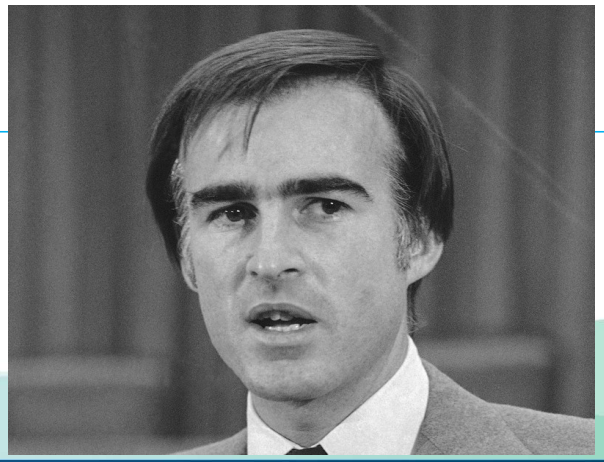
Start Time: 9:00 AM

What We Will Cover Today

- Some Basic, Background
- How Title 24, Part 6 is Developed
- **Matthew Haro, P.E.**
  - Acceptance Test Technician Certification Provider Program
    - Database Requirement for all ATTCPs
    - Shut-Off Lighting Controls
    - Demand Responsive Lighting Controls Acceptance Test
    - Automatic Daylighting Controls Acceptance Test
    - Institutional Tuning Power Adjustment Factor Acceptance Test
    - Outdoor Lighting Controls

Authority & Process

- **Public Resources Code (PRC 25402):** Reduction of wasteful, uneconomic, inefficient, or unnecessary consumption of energy
  - (a)(1) Prescribe, by regulation, lighting, insulation, climate control system, and other building design and construction standards that increase the efficiency in the use of energy and water…
  - Warren Alquist Act Signed into law in 1974 by Governor Ronald Reagan and launched by Governor Jerry Brown in 1975 which mandates updates Building Efficiency Standards and requires the building departments to enforce them through the permit process.

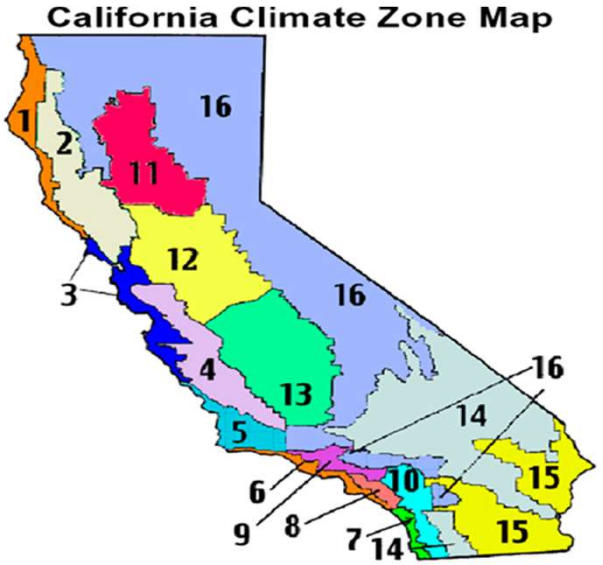


Goals of the California Energy Code

1. Increase building energy efficiency cost-effectively
2. Contribute to the state's GHG reduction goals
3. Enable pathways for all-electric buildings
4. Reduce residential building impacts on the electricity grid
5. Promote demand flexibility and self-utilization of PV generation
6. Provide tools for local government reach codes

Process Used to Updated Energy Codes

CEC staff, with input from utility partners and industry stakeholders, develop the triennial standards update



Opportunities for participation

- Utility-Sponsored Stakeholder Meetings
- CEC-Sponsored Workshops

Standards must be cost-effective

- Life-Cycle Costing Methodology
- Time Dependent Valuation (TDV)

2022 Standards Process

2022 STANDARDS UPDATE SCHEDULE	
DATE	**MILESTONES**
November 2018 - November 2019	Updated Weather Files
November 2018-December 2019	Metric Development
November 2018-July 2019	Measures Identified and approval
August 2019 to October 2020	Stakeholder meeting/workshop & final staff workshop
August 2020-October 2020	CASE Reports submitted to the CEC
February 2021	45-day Language Hearings
July 2021	Adoption of 2022 Standards at a Business Meeting
July 2021 to November 2021	Staff work on Software, Compliance Manuals, Electronic Documents Available to Industry
December of 2021	Approval of the Manuals
January 2022	Software, Compliance Manuals, Electronic Documents Available to Industry
January 1, 2023	Effective Date

Tentative Pre-Rulemaking Schedule

- **September 1**
  - Energy Savings and Process Improvements for Alterations and Additions
    - Roof deck insulation for low-slope roofs
    - Prescriptive attic insulation for alterations
    - Prescriptive duct sealing
    - Electric resistance water heating
    - Electric resistance space heating
    - 40-ft trigger for prescriptive duct requirements
    - Cool roof for steep-slope roofs
    - Cool roof for low-slope roof
- **September 9**
  - Nonresidential Grid Integration
  - Controlled Receptacle, CEA Proposal
- **September 10**
  - Verification Testing
- **September ~~17~~ moved to ??**
  - Indoor Air Quality Roundtable discussion with the outside world
- **September 22**
  - ~~Nonresidential Indoor Lighting~~
  - Outdoor lighting
  - Daylighting
- **September 23**
  - Computer Room Efficiencies
  - Pipe Sizing and Leak Testing for Compressed Air Systems
  - Refrigeration System Operation

Tentative Pre-Rulemaking Schedule (Cont.)

- **September 29**
  - Air Distribution
  - Nonresidential HVAC Controls
- **September 30 (TBD for Verification Testing)**
  - Controlled Environmental Horticulture
- **October 1**
  - Multifamily Domestic Hot Water
  - Multifamily Restructuring
- **October 6 and November 17**
  - Solar Photo Voltaic and Electrification
  - Multifamily All Electric
- **October 7**
  - Nonresidential Indoor Lighting
- **October 13**
  - Nonresidential High Performance Envelope
- **October 15 Place holder (May get pushed backed based on the Roundtable results from the September ~~17~~ ??)**
  - Indoor Air Quality Roundtable discussion with the outside world

Key Web-Link

2022 Title 24 Utility-Sponsored Stakeholder
http://title24stakeholders.com/

Building Energy Efficiency Program
http://www.energy.ca.gov/title24/

Comments to be submitted to:
https://efiling.energy.ca.gov/EComment/EComment.aspx?docketnumber=19-BSTD-03

NOTE: For this workshop comments To Be Submitted By September 25, 2020

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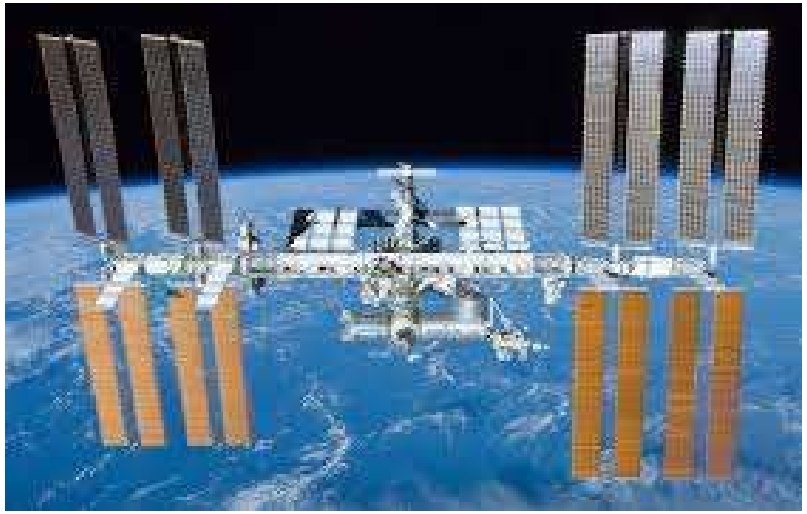
Comments For Todays Workshop

Due Date September 25, 2020 By 5:00 PM

Comments to be submitted to:
https://efiling.energy.ca.gov/EComment/EComment.aspx?docketnumber=19-BSTD-03

Questions?



Staff Proposals for the 2022 Energy Code

Acceptance Test Technician Certification Provider Program

Matthew Haro, Mechanical Engineer
Standards Compliance Office
September 10, 2020
California Energy Commission, Sacramento

Background

Acceptance Test Technician Certification Provider Program

- The Acceptance Test Technician Certification Provider (ATTCP) program was established by the CEC in the 2013 Energy Code.
  - The purpose of the program is to help improve compliance with acceptance testing for lighting controls and mechanical systems.
  - ATTCPs are approved by the CEC.
- The ATTCPs train, certify, and provide oversight (including quality assurance) for the following:
  - Acceptance Test Technicians (ATTs) who perform the acceptance tests required by the Energy Code; and
  - Acceptance Test Employers (ATEs) that employ ATTs.
- As of July 1, 2014, acceptance testing for lighting controls must be performed by a certified ATT.

Database Requirement for all ATTCPs

Issue

- The CEC evaluates energy efficiency programs for:
  - Public benefit
  - Compliance with the Energy Code
  - Greater energy savings, and
  - Cost effectiveness
- CEC access to ATTCP program related data is necessary to evaluate program performance.
- Current database functionality is only defined for mechanical ATTCPs.
- CEC staff access to information from these databases is inconsistent.

Background and Context

- Currently, there are two CEC approved lighting controls ATTCPs:
  - California Advanced Lighting Controls Training Program (CALCTP)
  - National Lighting Contractors Association of America (NLCAA)
- Currently, there are four CEC approved mechanical ATTCPs:
  - California State Pipe Trades Council (CSPTC)
  - National Energy Management Institute Committee (NEMIC)
  - National Environmental Balancing Bureau (NEBB)
  - Refrigeration Service Engineers Society (RSES)
- Each ATTCP has implemented a database system to track proposed and completed acceptance tests.
- ATTCPs databases are voluntary and support their quality assurance programs.

Current Code Requirements

- ATTCP database is not required under the Energy Code
- One exception:
  - To make a mechanical ATT equivalent to a HERS Rater for nonresidential duct leakage testing
    - This is for one acceptance test out of 19
    - All mechanical ATTCPs comply with this requirement
    - Lighting control ATTCPs are not subject to this requirement

Proposed Changes

Staff proposed to make a database system a requirement for all ATTCPs with the following goals (Title 24, Part 1, Section 10-103.1&.2):

- Support the ATTCP quality assurance program, and
- Provide printed and e-copies of completed acceptance tests to AHJs, and
- Provide verification services for AHJs, and
- Provide the CEC with administrative access, and
- Proposed language was updated based on feedback from the first workshop.

Potential Impacts

- No additional costs associated with this proposal
  - The ATTCPs have all (all six) implemented database systems that would comply with the intended requirements with only two needing minor adjustments.
- Compliance and Enforcement:
  - May improve AHJ enforcement of the Energy Code.
  - Will not add burden to existing compliance efforts by ATTCPs.

Shut-Off Lighting Controls

Topics to be Covered

The two topics concerning the Shut-Off Lighting Controls are:

1. Aligning the occupancy sensing lighting control construction inspection with the Energy Code, and
2. Include each type of occupant sensing control in Reference Appendix NA7.6.2.3.

1. Occupant Sensing Control Construction Inspection

Issue: Align the occupancy sensing lighting control construction inspection with the Energy Code.

- Construction inspection requirements are not closely linked with the Energy Code.

Background and Context

- ATTCPs train ATTs to:
  - Perform the lighting controls acceptance tests:
    - Construction inspection
    - Functional test
  - Complete the compliance documents
- The construction inspection includes the following:
  - Specific checklist regarding documentation and installation inspections directly from the Energy Code requirements.
  - Verification that the installation is complete in preparation for functional testing.
- Over 2,000 certified lighting controls ATTs
- Over 27,000 lighting controls acceptance tests performed
  - The bulk (over 6,000) were performed in the county of Los Angeles

Current Code Requirements

NA7.6.2.1 General Requirements

Verify that the shut-off control qualifies as one of the required control types, is installed, and is fully functional in accordance with each applicable requirement in section 130.1(c), or that the application meets one of the exceptions. List each specific exception claimed, from section 130.1(c).

NA7.6.2.2 Occupancy Sensing Lighting Control Construction Inspection

Prior to Functional testing, verify and document the following:

(a) Occupancy sensor has been located to minimize false signals.

(b) No closer than four (4) feet from a HVAC diffuser.

(c) Passive infrared sensor pattern does not enter into adjacent zones.

(d) Occupancy sensors do not encounter any obstructions that could adversely affect desired performance.

(e) Ultrasonic occupancy sensors do not emit audible sound.

Proposed Change

- Clarify the overall acceptance test requirements for the occupancy sensing lighting controls.
- Verify that the construction inspection requirements are supported by the Energy Code:
  - Minimizing false signals, being at least four feet from a HVAC diffuser, not detecting in adjacent zones, and being free of obstruction are not explicitly in the Energy Code.
  - Ultrasonic occupancy sensors not emitting an audible sound is supported in the Energy Code (section 110.9(b)6Bii).
- No changes from the first workshop

Potential Impacts

- No new tests or requirements.
- Changes are for clarity only.
- ATTCPs may update certification training materials.
- No additional burden to AHJs identified.

Staff would like to hear if stakeholders have any specific suggestions for how to improve the construction inspection requirements.

2. Include Each Type of Occupant Sensing Control in Reference Appendix NA7.6.2.3

Issue: NA7.6.2.3 does not clearly specify each type of occupancy sensing controls.

- There are four types of occupant sensing controls that are defined in the Energy Code at this time: occupant, partial-on, partial-off, and vacancy sensors.

Background

- The 2016 acceptance test compliance document included separate sections: occupant, partial-on, partial-off, and vacancy sensors.
- NA7.6.2.3 does not reflect compliance options.
- Industry and enforcement are hampered by inadequate compliance documentation.
- Occupancy sensors are only one type of occupant sensing control.
  - There are four types of controls that comply with the Energy Code.

Current Code Requirements

- The current occupant sensing controls acceptance test procedures in NA7.6.2.3 are mostly specific to occupancy sensors and do not address partial-on or partial off occupant sensors.
- There is one step that addresses vacancy sensors.

Proposed Change

- Clarify the occupant sensing controls acceptance test to include requirements to test each type of occupant sensing controls.
- Proposed language was updated based on feedback from the first workshop.

Potential Impacts

- No new tests or requirements.
- Changes are for clarity only.
- ATTCPs may update certification training materials.
- No additional burden to AHJs identified.

Staff would like to hear if stakeholders agree with the proposed changes or have any other suggestions for how to improve the acceptance test requirements in NA7.6.2.3.

Demand Responsive Lighting Controls Acceptance Test

Issue

The NA7.6.3 procedures currently include steps that are not able to be verified through visual inspection prior to functional testing and a reference to requirements in the Energy Code without specific directions.

- Align the construction inspection with the Energy Code and the intended purpose of construction inspections.

Background and Context

- The requirements in the acceptance testing procedures are based on the criteria set forth in the Energy Code.
- The demand responsive control requirements were expanded for the 2019 Energy Code.
- However, the NA7.6.3.1 requirements were not updated accordingly.
  - ATTs and ATTCPs must interpret the requirements in the field.
  - CEC Staff has provided interpretations that should be added to the Energy Code for clarification.
  - The current requirements are difficult to enforce for AHJs.
- Staff revised the compliance document (NRCA-LTI-04-A) to include specific requirements from section 110.12(a).

Current Code Requirements

Prior to Functional testing, verify and document the following:

(a) That the demand responsive control is capable of receiving a demand response signal directly or indirectly through another device and that it complies with the requirements in section 130.1(e).

(b) If the demand response signal is received from another device (such as an EMCS), that system must itself be capable of receiving a demand response signal from a utility meter or other external source.

Proposed Changes

- Staff recommends that the CEC replace the current construction inspection requirements with items from section 110.12 that can be verified through visual inspections prior to functional testing.
- Proposed language was updated based on feedback from the first workshop

Potential Impacts

- No new tests or requirements.
- Changes are for clarity only.
- ATTCPs may update certification training materials.
- No additional burden to authorities having jurisdiction (AHJs) identified.

Is there any additional relevant information staff should consider related to this recommendation?

Automatic Daylighting Controls Acceptance Test

Topics to be Covered

Staff recommends changes to three topics concerning the automatic daylighting controls:

1. Align the construction inspection of the acceptance test procedures for automatic daylighting controls with the Energy Code.
2. Add daylight dimming plus off power adjustment factor check to the stepped switching/dimming functional testing requirements.
3. Specify that acceptance testing is required for automatic daylighting controls in secondary sidelit daylit zones complying with section 140.6(d).

1. Automatic Daylighting Controls Construction Inspection

Issue: The automatic daylighting controls construction inspection consists of general language that the controls comply with applicable requirements in section 130.1(d) without providing any further details about which requirements are applicable for the construction inspection.

Background and Context

- The language in NA7.6.1.1 consists of a general statement that refers to section 130.1(d).
- Compliance documents follow the requirements and exceptions in section 130.1(d).
- Industry and enforcement can easily track the compliance document to the regulation (section 130.1(d)).

Current Code Requirements

NA 7.6.1.1 Construction Inspection

Verify that automatic daylighting controls qualify as one of the required control types, are installed, and fully functional in accordance with each applicable requirement in section 130.1(d).

Proposed Changes

- Replace the construction inspection with a checklist of applicable requirements from section 130.1(d).
- No changes from the first workshop

Potential Impacts

- No new tests or requirements.
- Changes are for clarity only.
- ATTCPs may update certification training materials.
- No additional burden to AHJs identified.

Staff would like to hear if stakeholders have any specific suggestions for additional improvements to the construction inspection requirements.

2. Automatic Daylighting Controls add Power Adjustment Factor

Issue: Add daylighting dimming plus off power adjustment factor check to the stepped switching/dimming functional testing requirements.

- The functional testing procedures for stepped switching/dimming control systems in NA7.6.1.2.1 are missing a check for the daylight dimming plus off power adjustment factor (PAF).

Background and Context

- The automatic daylighting controls acceptance testing requirements:
  - Continuous dimming control systems
  - Stepped dimming/switching control systems
- Staff confirmed the intent of the regulations to include the PAF check in both sets of functional testing procedures.
- Staff consulted with ATTCPs on the potential impacts.
- Staff revised the compliance document (NRCA-LTI-03-A) to include the missing step.
- No code change was required.

Current Code Requirements

- The functional test is for systems with more than 10 levels of controlled light output in a given zone.
- Identifies the minimum daylighting location in the controlled zone using one of the following methods:
  - Illuminance method
  - Distance method
- Requires the ATT to perform the no-daylight, full-daylight, and partial-daylight tests.
- There is no explicit consideration given for the PAF in the functional test.

Proposed Changes

- Use NA7.6.1.2.2 (continuous dimming control systems) as the guide.
- Maintain the key functional test requirements.
- Both sets of functional testing procedures should require the ATT to verify the daylight dimming plus off capability if the PAF is claimed.
- Proposed language was updated based on feedback from the first workshop.

Potential Impacts

- No new tests or requirements.
- Changes are for clarity only.
- ATTCPs may update certification training materials.
- No additional burden to AHJs identified.

Is there any additional relevant information staff should consider related to this recommendation?

3. Automatic Daylighting Controls in Secondary Sidelit Daylit Zones

Issue: NA7.6 does not explicitly state that acceptance testing is required for automatic daylighting controls in secondary sidelit daylit zones complying with the prescriptive requirements in section 140.6(d).

Background and Context

- The requirements for secondary sidelit daylit zones are in section 140.6(d).
- Enforcement of section 140.6(d) is provided through its reference to section 130.1(d).
- Section 130.1(d) is enforced through acceptance test NA7.6.1.
- ATTCPs trained ATTs to perform the acceptance testing for primary and secondary sidelit daylit zones.
- AHJs have been relying on the ATTCP trained ATTs.
- ATTCPs have been enforcing secondary sidelit daylit zones using NA7.6.1 without a direct reference in compliance with CEC direction.

Current Code Requirements

- Reference Appendix NA7.6.1 does not clearly require automatic daylighting controls in secondary sidelit daylit zones.
- Staff confirmed the intent that secondary sidelit daylit zones should be enforced using the same methods as the primary zones.

Proposed Changes

- Add clear reference in NA7.6 to section 140.6(d).
- Staff also recommends the language in section 130.4(a)3 of the Energy Code be updated.
- No changes from the first workshop

Potential Impacts

- No new tests or requirements.
- Changes are for clarity only.
- ATTCPs may update certification training materials.
- No additional burden to AHJs identified.

Do stakeholders agree that this clarification is necessary and will have no significant impacts?

Institutional Tuning Power Adjustment Factor Acceptance Test

Topics to be Covered

Staff recommends changes to two topics concerning the institutional tuning power adjustment factor acceptance test:

1. Institutional Tuning located in NA7.7.
2. Simplify the requirements for functional testing.

1. Institutional Tuning located in NA7.7

Issue: The acceptance testing procedures for the institutional tuning PAF acceptance test are in section within NA7.7, while other acceptance tests are in NA7.6.

Background and Context

The ATTCPs already train ATTs to perform this acceptance test despite its location in NA7.7.

Current Code Requirements

- NA7.7 describes the requirements for lighting controls installation, with the exception of NA7.7.5.2.
- NA7.7.5.2 describes the acceptance test requirements for institutional tuning:
  - Construction inspection
  - Functional testing
    - Observation of tuning, or
    - Verification of tuning

Proposed Changes

- Staff will clarify NA7.7 to include a better description of the contents, including the acceptance test.
- No changes from the first workshop

Potential Impacts

- No new tests or requirements.
- Changes are for clarity only.
- ATTCPs may update certification training materials.
- No additional burden to AHJs identified.

Is there any additional relevant information staff should consider related to this recommendation?

2. Institutional Tuning Power Simplify Requirement

Issue: The functional testing procedures currently state that if the ATT is observing the tuning of a system the party responsible for the tuning must certify that the remainder of the system is tuned in a similar manner.

- However, there is no mechanism for someone other than the ATT to certify results.
- The option to observe systems during test and have someone else certify the others are correct is delegating ATT authority to a non-certified technician.

Background and Context

- The two methods for the ATT to verify installation:
  - Observe the tuning as it is performed, or
  - Verify the tuning afterward.
- The ATT can choose to work with the person performing the tuning or return once all systems are tuned.
- The CEC has provided no specific procedure for someone other than an ATT to certify tuning results.
- The ATTCPs have trained ATTs to perform the institutional tuning acceptance tests.
- However, these procedures can create situations where the ATT must fail the system if the person tuning is unavailable.

Current Code Requirements

- The current acceptance test procedures are in NA7.7.5.2.3
  - Do not provide adequate compliance options with feedback from the ATTCPs.
- ATTCPs, ATTs, and ATEs are hampered by an inadequate acceptance test procedure and compliance documentation.
  - Staff has heard directly from the ATTCPs that the current procedures are not practical to implement because the CEC has not provided a place for this on the NRCA-LTI-05-A or any other compliance document.

Proposed Changes

- Minor changes to be consistent with the Energy Code and ensure the procedures are implementable.
- No changes from the first workshop

Potential Impacts

- No new tests or requirements.
- Changes are for clarity only.
- ATTCPs may update certification training materials.
- No additional burden to AHJs identified.

Are there any specific clarifications stakeholders suggest for these test procedures?

Outdoor Lighting Controls

Topics to be Covered

Staff recommends changes to two topics concerning the Outdoor Lighting Controls:

1. Consolidate the motion sensor procedures into one acceptance test
2. Combine astronomical time switch and automatic scheduling controls tests

1. Outdoor Lighting Controls Motion Sensor Procedures

Issue: There is a separate acceptance test for motion sensors, automatic scheduling controls, and automatic scheduling controls installed in conjunction with motion sensors.

- Motion sensors are only permitted to be installed with automatic scheduling controls.

Background and Context

- For the 2019 Energy Code, the CEC changed the outdoor lighting controls requirements in section 130.2(c).
  - Automatic scheduling controls would always be required.
  - Motion sensors are only required in specific applications.
  - Therefore, motion sensors will not be installed without automatic scheduling controls.
- The ATTCPs already train the ATTs to perform these acceptance tests.
- However, there are instances in the field where ATTs and AHJs are confused about how the compliance documents are to be completed.

Current Code Requirements

The 2019 acceptance test procedures include procedures for three combinations of installation using motion sensors and automatic scheduling controls:

- Motion Sensors (alone)
- Automatic scheduling controls (alone)
- Automatic scheduling controls with motion sensors

Proposed Changes

- Staff proposed to eliminate the redundancy of one of these existing acceptance tests in NA7.8:
  - Automatic scheduling controls with motion sensors.
- The resulting acceptance test procedures will be:
  - Automatic scheduling controls, and
  - Motion sensors that will require automatic scheduling controls to be tested first.
- Proposed language was updated based on feedback from the first workshop.

Potential Impacts

- No new tests or requirements.
- Changes are for clarity only.
- ATTCPs may update certification training materials.
- No additional burden to AHJs identified.

Is there any additional relevant information staff should consider related to this recommendation?

2. Combine Astronomical Time Switch and Automatic Scheduling Controls Tests

Issue: The astronomical time switch control acceptance test is redundant to the automatic scheduling controls acceptance test (NA7.8.5 and NA7.8.6).

- The 2019 compliance document does not include a separate section for each.

Background and Context

- Astronomical time switch controls are a type of automatic scheduling control.
- NA7.8 currently contains an acceptance test for both.
- The procedures for both are identical.
- Using the current compliance document:
  - ATTCPs have trained ATTs to perform these acceptance tests.
  - AHJs have been using the ATTCP program to effectively enforce these requirements.

Current Code Requirements

- The current acceptance test has identical requirements for both:
  - astronomical time switch controls
  - automatic scheduling controls
- The compliance documents already include both acceptance tests on one form.

Proposed Changes

- Combine the astronomical time switch and automatic scheduling controls sections from NA7 (NA7.8.5 and NA7.8.6).
- Proposed language was updated based on feedback from the first workshop.

Potential Impacts

- No new tests or requirements.
- Changes are for clarity only.
- ATTCPs may update certification training materials.
- No additional burden to AHJs identified.

Is there any additional relevant information staff should consider related to this recommendation?

Minor Editorial Recommendations

Proposed Changes

These are nonsubstantive, non-controversial editorial changes that can be made to the Energy Code.

- Correcting them is intended to clarify existing requirements.
  - These include grammar, punctuation, structure, consistency, and wording of procedures.
- These minor editorial recommendations include the following sections:
  - Title 24, Part 1, Sections 10-103.1 and 10-103.2
  - Reference Appendix Sections NA7.6.1, NA7.6.2, NA7.6.3, NA7.6.4, NA7.7.5.2, and NA7.8.
- No changes from the first workshop.

Comments for Todays Workshop

Due Date September 25, 2020 By 5:00 PM

Comments to be submitted to:
Docket number 19-BSTD-03

The staff report and this presentation are available at the following event page:
Staff Workshop - Acceptance Testing Provisions

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Closing Remarks and Thank You!