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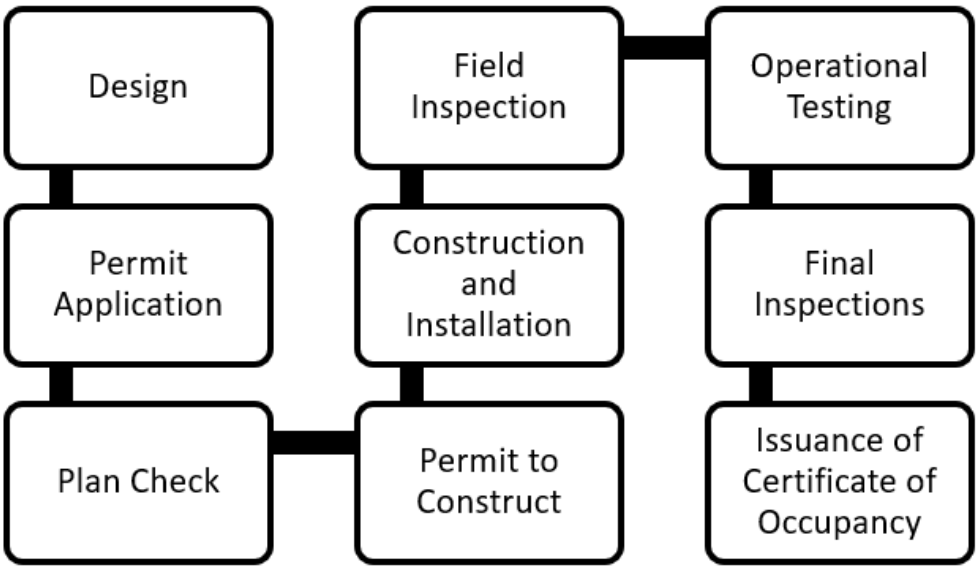
Acceptance Test Requirements

Overview

Acceptance testing is performed during the operational testing phase of project permitting (shown in Figure 14-1: Idealized International Code Council Permitting Process for Building Permit Applications) and before final inspections and the issuance of the certificate of occupancy. See Nonresidential Compliance Manual Chapter 2 for more information regarding the phase of project permitting.

Figure 14-1: Idealized International Code Council Permitting Process for Building Permit Applications



Source: California Energy Commission staff

However, it is advisable (although not required) to include professionals who are knowledgeable regarding the acceptance test procedures and requirements in the design phase as well.

What's New for 2025

Mechanical Systems and Equipment - Section 120.5

New Acceptance Test:

- Cooling Tower Conductivity Controls

Lighting Controls

Minor Clarifications:

- Changed all occurrences of "automatic daylighting controls" to "daylight responsive controls" to be consistent with the terminology change in the standards.
- Improved the construction inspection specification for verifying the communication protocols used in controlled receptacles demand responsive controls.

Covered Process Systems and Equipment

Major Modifications:

- A new table would be added to the compliance form to allow the design team to add information regarding evaporators for the calculation of evaporator specific efficiency to test for compliance to code requirements (NRCC-PRC-E).
- Pipe insulation verification must be added to compliance documents (NRCC-PRC-E, NRCC-PRC-01-E, NRCI-PRC-E).
- Lab Exhaust Ventilation System Acceptance Test must be updated to include procedures on testing the new requirement for occupancy based VAV and for updated fan power and simple turndown controls requirements, and compliance forms must be updated to include detail on the configuration of lab air equipment (NA7.16, NRCC-PRC-E, NRCA-PRC-14-F).

Minor Clarifications:

- Minimum efficacy for indoor and greenhouse CEH lighting must be updated (NRCC-PRC-E).

What Is Acceptance Testing

From simple thermostats and manual light switches to complex building automation systems, controls are integral to building health, safety, comfort, and energy efficiency.

Acceptance test requirements specify targeted inspections and functional performance tests that demonstrate that the building components, equipment, systems, and interfaces conform to the Energy Code, inclusive of Reference Nonresidential Appendix NA7, as specified on applicable construction documents.

This helps ensure that the building achieves the energy savings potential specified in the design and protects installing technicians by providing demonstrable proof that the system functioned as required by code when it was installed.

Roles and Responsibilities

Please see Chapter 2 for a complete discussion concerning the roles and responsibilities of all parties.

Field Technician

Please refer to Chapter 14.1.2.1 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Acceptance Test Technician

An Acceptance Test Technician (ATT) is a certification standard for technicians, contractors, engineers, architects, and commission agents that design, install, and commission (perform acceptance testing for) lighting controls and mechanical system in newly constructed or existing nonresidential buildings or spaces.

The certification is restricted to applicants with a minimum of three years of professional experience and expertise in either lighting or mechanical controls. Qualifying experience for certification is provided by verifiable employment as an electrical contractor, certified general electrician, licensed architect, professional engineer, controls installation and startup contractor, HVAC installer, mechanical contractor, testing and balancing certified technician, or certified commissioning professional with verifiable experience in lighting controls or HVAC installations. ATTs are provided classroom and laboratory training to perform acceptance

testing. ATTs must pass classroom and laboratory testing to gain their certification. The ATT is required to work with the California Energy Commission (CEC) -approved acceptance test technician certification provider (ATTCP) to track and verify quality assurance of their acceptance test performance.

- A certified lighting controls ATT is required to perform the lighting controls acceptance tests referenced by Section 130.4 and sign the certificate(s) of acceptance (NRCAs).
- A certified mechanical ATT is required to perform the mechanical acceptance tests referenced by Section 120.5 and sign the certificate(s) of acceptance.
- Other acceptance tests, such as those for covered processes and building envelope, do not require a certified ATT.

More information on becoming certified and other information on ATTs can be found at https://www.energy.ca.gov/programs-and-topics/programs/acceptance-test-technician-certification-provider-program.

Responsible Person

Please refer to Chapter 14.1.2.3 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Commissioning Provider

A commissioning provider (also referred to as a commissioning agent) is not defined by the Energy Code but is an industry term for a person who may be contracted by the owner to verify functional performance testing is conducted (among other responsibilities) to ensure proper performance at building turnover. Commissioning during construction is required by Section 120.8. In general, newly constructed nonresidential buildings with more than 10,000 square feet of conditioned floor area must comply with all the requirements in Section 120.8 (full commissioning). Smaller buildings are required to complete just the design review phase of commissioning. The commissioning requirements in Section 120.8 do not apply to healthcare facilities, which have parallel requirements in Chapter 7 of the California Administrative Code (Title 24, Part 1), and do not apply to additions or alterations to existing buildings.

Although system commissioning and acceptance testing are related, not all projects that require acceptance testing will also require full commissioning. If a commissioning agent is part of the project team, they will often be present for functional performance testing of major building systems to verify the tests were completed and passed on behalf of the building owner. (Commissioning agents may instead perform acceptance testing themselves, and if this is the case, they may also need to be a certified ATT.) See Chapter 2 for more information regarding commissioning and commissioning agents.

Enforcement Agency

The certificate of acceptance must be provided on site for the enforcement agency, typically at final inspection, to receive the certificate of occupancy. Many enforcement agencies will issue a provisional certificate of occupancy and allow the builder to fix or complete specific elements within a specified time frame. Enforcement agencies may not release a *final* certificate of occupancy unless the submitted certificate of acceptance demonstrates that the specified

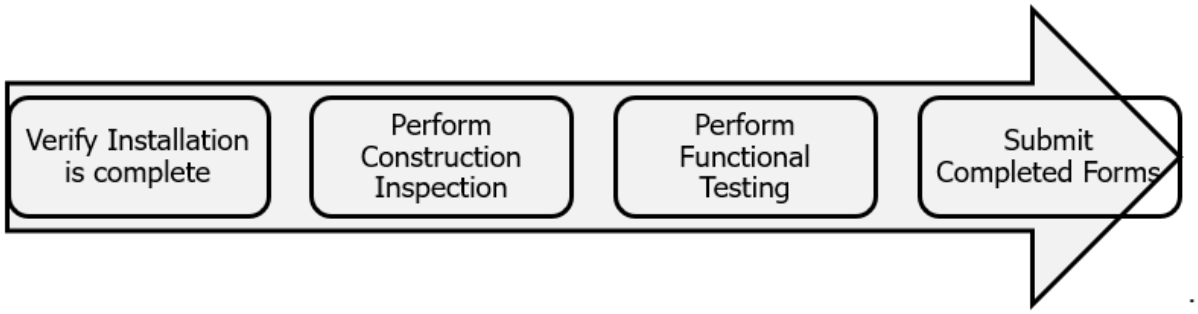
systems and equipment have been shown to perform in accordance with the applicable acceptance requirements.

The enforcement agency has the authority to require the field technician or responsible person to demonstrate competence to its satisfaction. When a certified ATT is required to complete an acceptance test, the enforcement agency may verify the ATT certification status through the ATTCP before issuing a certificate of occupancy or confirm that the NRCA form was completed via an approved ATTCP by the certified ATT in which the provider name and logo will be included within the electronic NRCA form and is not completed by hand. For details on how to do this most efficiently, see the Acceptance Testing Process below. Please see Chapter 2 for more information regarding enforcement agencies' roles and responsibilities.

Acceptance Testing Process

See Chapter 2 for a more complete discussion of the permitting process. As was shown in Figure 14-1: Idealized International Code Council Permitting Process for Building Permit Applications, the acceptance testing is performed during the operational testing phase of permitted construction. The acceptance process itself follows four major steps as shown in Figure 14-2: Steps in the Acceptance Testing Process.

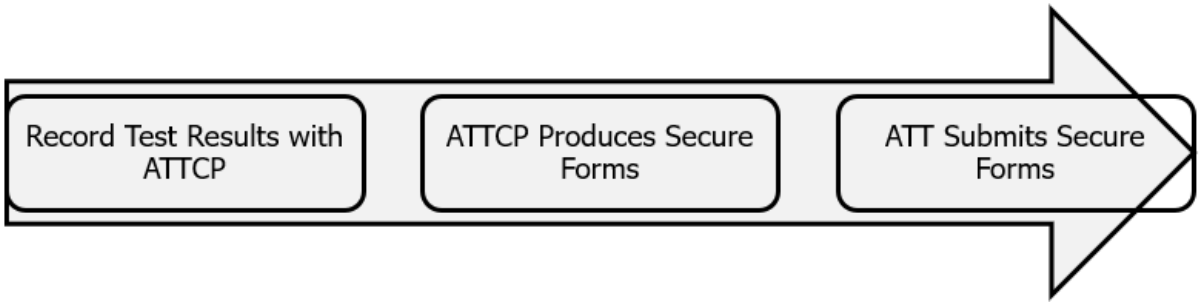
Figure 14-2: Steps in the Acceptance Testing Process



Source: California Energy Commission

The acceptance test process is slightly different when an ATT is required. As shown in Figure 14-3: Final Step to Submit Completed Forms for the ATT Acceptance Testing Process, the difference is in the use of the ATTCP when completing and submitting the completed forms (the final step in the general acceptance test process shown in Figure 14-2: Steps in the Acceptance Testing Process).

Figure 14-3: Final Step to Submit Completed Forms for the ATT Acceptance Testing Process



Source: California Energy Commission

Reviewing the acceptance requirements with the contractor before installation may help the process run smoothly. In some cases, performing tests immediately after installation is most economical, though this requires the complete installation of any associated systems and equipment necessary for proper system operation. Awareness of the acceptance test requirements can allow the contractor to identify a design or construction practice that would not comply with the Energy Code before equipment installation.

A technician or ATT assumes the responsibility for performing the required acceptance test requirement procedures in NA7 and reproduced on the certificates of acceptance for convenience. The CEC expects that the same technician or ATT that installed the efficiency feature will perform all the required acceptance tests for that feature, but this is not required. The technician or ATT who performs the acceptance test is responsible for identifying and remediating all performance deficiencies, repeating the test (if necessary) until the specified efficiency feature is performing in accordance with the acceptance test requirements.

In addition, the CEC makes the following recommendations as good industry practice but are not required:

- When planning construction, consider costs of testing within subcontractor bids, scheduling time within the overall construction schedule and coordination with commissioning if required on the project.
- Purchasing sensors and equipment with calibration certificates often reduces the amount of time required for site calibration, which can lower overall costs.
- In some cases, performing tests immediately after installation or during set-up and commissioning is most economical, though this requires the complete installation of any associated systems and equipment necessary for proper system operation.

Verify Installation is Complete

The technician or ATT is responsible for verifying that the efficiency feature is installed as indicated by the approved plans, including the certificate of compliance. These plans, including the certificates of compliance, are approved by the enforcement agency during the permit application phase. (See Figure 14-1: Idealized International Code Council Permitting Process for Building Permit Applications). See Chapter 2 for a detailed explanation of the permitting process and roles and responsibilities. The prescriptive Certificates of Compliance can be completed by using the Virtual Compliance Assistant (VCA) Tool from Energy Code Ace, or via the Performance Approach. The VCA Tool or approved compliance software will indicate what acceptance tests are to be completed for each efficiency features at permit application phase. The technician or ATT must verify with the help of the responsible person what acceptances are to be performed and on what efficiency features. The technician or ATT is then to install the efficiency feature and ensure that it is operational and ready for acceptance testing.

Perform Construction Inspection

Please refer to Chapter 14.1.3.2 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Perform Functional Testing

Please refer to Chapter 14.1.3.3 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Complete and Submit Certificate of Acceptance Forms

Once the efficiency feature passes the acceptance test requirements, the technician or ATT who performed the acceptance test completes the respective certificate of acceptance form and signs it to assert that the information recorded on the certificate is true and correct. In some instances, it may be beneficial for the technician or ATT to complete the certificate of acceptance form when the efficiency feature does not pass acceptance testing to support the feature being improved to that it can pass. This may help the technician or ATT identify the issues or errors that the efficiency feature is having that prevent it from passing. This information can be used to convey these issues to the responsible person for the project for remedy. A responsible person for the project must also sign the form to ensure that the performance of the scope of work specified by the certificate of acceptance and the test results provided by the field technician are complete.

As noted previously, the responsible person may also perform the field technician's responsibilities and, if so, must sign the field technician declaration on the certificate of acceptance. If the acceptance test requires a certified ATT, the responsible person must be a certified ATT to perform the acceptance test.

The completed and signed certificate of acceptance form must be submitted to the enforcement agency in accordance with the local laws, ordinances, regulations, or customs.

Building inspectors may review the forms during inspection. Inspectors can also verify the ATT certification status through the ATTCP online certification lists. Finally, the inspector can verify that the completed form is valid by relying on the watermark provided by the ATTCP or by contacting the ATTCP to verify the form over the phone or via internet. Some ATTCPs provide a QR-Code for a quick and simple verification. ATTCP documents should not be accepted if completed by hand, completed electronically outside the ATTCP online interface, or fails to show the ATTCP logo and watermark.

Certificate of Acceptance

Certificate of acceptance (NRCA) forms consist of worksheets to document the results of construction inspections and functional testing, as well as a signatory page. Appendix A provides a list of NRCA documents.

The name of the compliance document can give you clues about the documents use. The NRCA prefix indicates a nonresidential certificate of acceptance which is used for nonresidential buildings. The next set of letters specifies the building component; for example, "LTI" indicates indoor lighting. The suffix will tell you whether a certified acceptance test technician "-A" or field technician "-F" is appropriate to perform the functional performance test. Remember that an ATT can act as a field technician, but a current ATT certification is required for someone to sign as an ATT.

Acceptance Testing Requirements

The following provides a summary of the acceptance testing requirements and testing procedures in the Energy Code for mechanical systems, lighting controls, building envelope, and covered processes.

Separate files providing detailed instructions on how to conduct acceptance tests are located on the Energy Commission website, https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-building-energy-efficiency.

Building Envelope Acceptance Testing Requirements

Envelope acceptance testing may be performed by any field technician; however, the installing contractor typically performs this testing.

Envelope acceptance testing is required for all buildings except fenestration products removed and reinstalled as part of alteration or addition to buildings per Section 110.6(a). These requirements apply to newly constructed buildings and to alterations.

The building envelope acceptance testing procedures are specified in Reference Nonresidential Appendix NA7.4.

The building envelope features that require acceptance testing include:

- NA7.4.1 Fenestration.
- NA7.4.2 Window Films.
- NA7.4.3 Dynamic Glazing.
- NA7.4.4 Clerestories for Power Adjustment Factor.
- NA7.4.5 Interior and Exterior Horizonal Slats for Power Adjustment Factor.
- NA7.4.6 Interior and Exterior Light Shelves for Power Adjustment Factor.

Fenestration, Window Films, and Dynamic Glazing Acceptance Testing - NA7.4.1, NA7.4.2, and NA7.4.3

These tests are required for newly installed fenestration, window film, and dynamic glazing in new construction, additions, and alterations for all buildings per Section 110.6(a).

These fenestration products must be tested according to NA7.4 to verify that the National Fenestration Rating Council (NFRC) Label Certificate, or Certificate of Installation NRCI-ENV-E for fenestration using default values of Tables 110.6-A and 110.6-B or per NA6, is provided for each fenestration product being installed. These certificates identify the thermal performance of the fenestration product (e.g., U-factor, solar heat gain coefficient, and visible transmittance).

This test also verifies that the thermal performance of installed fenestration products matches the label certificate, certificate of compliance, and plan specifications.

Daylighting Design Power Adjustment Factors Acceptance Testing - NA7.4.4, NA7.4.5, and NA7.4.6

These tests are required to qualify for power adjustment factors for clearstory fenestration, interior and exterior horizontal slats, and interior and exterior light shelves in nonresidential and hotel/motel areas per Section 140.3(d), Section 140.6(a)2L, and Section 110.6(a)6.

These daylighting design features must be tested according to NA7.4 to verify that clerestory windows, interior and exterior horizontal slats, and interior and exterior light shelves meet the daylighting design requirements in the Energy Code when claiming a power adjustment factor (PAF) for lighting systems in nonresidential and hotel/motel buildings.

Spaces that have clerestory windows, horizontal slats, or light shelves, and compliant automatic daylighting controls may receive a power adjustment factor if the daylighting feature meets the design criteria in Energy Code.

Mechanical Systems Acceptance Testing Requirements

Outdoor Air

This test (NA7.5.1.2) ensures the constant-volume air-handling unit provides adequate outdoor air ventilation to the spaces served under all operating conditions, while NA7.5.1.1 supports variable-air-volume systems. Systems requiring demand ventilation controls per Section 120.1(c)3 must conform to Section 120.1(c)4E regarding the minimum ventilation rate when the system is in occupied mode. Related acceptance tests for these systems include the following:

- NA7.5.2 Constant-Volume, Single-Zone, Unitary Air Conditioners and Heat Pump Systems Acceptance
- NA7.5.4 Air Economizer Controls Acceptance (if applicable)
- NA7.5.5 Demand-Controlled Ventilation Systems Acceptance (if applicable)

This test is restricted to certified mechanical ATTs using Certificate of Acceptance NRCA-MCH-02-A.

HVAC and Heat Pumps

Please refer to Chapter 14.3.2.2 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Duct Leakage

This test (NA7.5.3) verifies all duct work associated with all nonexempt constant-volume, single-zone HVAC units (in other words, air conditioners, heat pumps, and furnaces) meet the material, installation, and insulation R-values per Section 120.4(a) and leakage requirements outlined either in Section 120.4(g)1 for new duct systems or Section 141.0(b)2D and Section 141.0(b)2Eii for existing duct systems.

Economizer, DOAS, HRV, or ERV

This test (NA7.5.4) is restricted to certified mechanical ATTs and is intended to verify Energy Code compliance for nonresidential and hotel/motel buildings with newly installed economizers, dedicated outdoor air system (DOAS), heat recovery ventilation (HRV) systems, and energy recovery ventilation (ERV) system. Economizers must be certified to the CEC in compliance with JA6.3.

Submit one Certificate of Acceptance (NRCA-MCH-05-A) for each economizer, DOAS, HRV, or ERV system that must demonstrate compliance with the Energy Code. For direct Energy Code reference, see JA6.3, NA7.5.4, Section 140.4(e), Section 120.5(a)4.

Functionally testing an air economizer cycle verifies that an HVAC system uses outdoor air to satisfy space-cooling loads. There are two types of economizer controls: stand-alone packages and DDC controls. The stand-alone packages are commonly associated with small unitary

rooftop HVAC equipment. DDC controls are typically associated with built-up or large packaged air-handling systems.

Cooling fan systems greater than 33,000 Btu/hr may use an economizer to comply with prescriptive requirements in Section 140.4(e). Air economizers must be able to provide 100 percent of the design supply air with outside air; water economizers must be able to provide 100 percent of the design cooling load at 50°F dry-bulb and 45°F wet-bulb.

Demand Ventilation Control

Please refer to Chapter 14.3.2.5 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Supply Fan Controls

Please refer to Chapter 14.3.2.6 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Valve Leakage Test

Please refer to Chapter 14.3.2.7 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Water Temperature Reset

Please refer to Chapter 14.3.2.8 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Variable-Flow Control

Please refer to Chapter 14.3.2.9 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Automatic Demand Shed Control

Please refer to Chapter 14.3.2.10 of the *2022 Nonresidential and Multifamily Compliance Manual*.

FDD — Packaged Units

Please refer to Chapter 14.3.2.11 of the *2022 Nonresidential and Multifamily Compliance Manual*.

AHU and Zone Terminal FDD

Please refer to Chapter 14.3.2.12 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Energy Storage for HVAC

This test (NA7.5.13) verifies proper operation of distributed energy storage DX systems. Distributed energy systems reduce peak demand by operating during off-peak hours and storing cooling, usually in the form of ice. During peak-cooling hours, the ice is melted to avoid compressor operation.

This acceptance test applies to direct expansion (DX) systems with distributed energy storage (DES/DXAC). These acceptance requirements are in addition to those for those other systems or equipment such as economizers or packaged equipment.

This test is restricted to certified mechanical ATTs using NRCA-MCH-14-A to verify that the system conforms with the Energy Code requirements.

Thermal Energy Storage

This test (NA7.5.14) verifies proper operation of thermal energy storage (TES) systems. TES systems reduce energy consumption during peak-demand periods by shifting energy consumption to nighttime. Operation of the thermal energy storage compressor during the night produces cooling energy, which is stored in the form of cooled fluid or ice in tanks. During peak-cooling hours, the thermal storage is used for cooling to prevent the need for chiller operation.

The test will ensure that the TES system is able to charge the storage tank during off-peak hours and conversely discharge the storage tank during on-peak hours. Since the chiller may operate more efficiently at night when ambient temperatures are lower, the system may save cooling energy in some climate zones. This acceptance test is intended for TES systems that are used in conjunction with chilled-water air-conditioning systems.

This test is restricted to certified mechanical ATTs using NRCA-MCH-15-A to verify that the system conforms with the Energy Code requirements.

Supply Air Temperature Reset Controls

Please refer to Chapter 14.3.2.15 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Condenser Reset Controls

Please refer to Chapter 14.3.2.16 of the *2022 Nonresidential and Multifamily Compliance Manual*.

EMCS System Acceptance

This acceptance test (Section 120.5[a]17) ensures that when an energy management control system (EMCS) is installed for compliance with the Energy Code, it is properly installed, is operational, and is in compliance with each relevant requirement in the standards.

This test is restricted to certified mechanical ATTs using NRCA-MCH-18-A to ensure that when an EMCS is installed for compliance with the Energy Code, it is properly installed, is operational, and is in compliance with each relevant requirement in the standards.

Occupancy Sensor/Occupied Standby

Please refer to Chapter 14.3.2.18 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Cooling Tower Conductivity Controls

This test (NA7.5.18) verifies that the open or closed-circuit cooling tower conductivity controls, makeup water, and overflow alarms are installed per the specifications in the plan and certificate of compliance (NRCC-MCH-E or NRCC-PRF-01-E) via the testing protocols of NA7.5.18.2.

This test is restricted to certified mechanical ATTs using the NRCA-MCH-24-A to ensure that the system is functional and complies with the design and with the Energy Code requirements in Section 110.2(e)7.

Lighting Controls Acceptance Testing Requirements

Lighting controls acceptance testing must be performed by a certified lighting controls ATT to certify the indoor and outdoor lighting controls serving the building, area, or site meet the acceptance requirements.

Lighting controls acceptance testing is required for all installed lighting controls in nonresidential buildings and hotel/motel buildings per Section 130.4(a). These requirements apply to newly constructed buildings and alterations. For alterations where lighting controls are added to control 20 or fewer luminaires, acceptance testing is not required.

The lighting controls acceptance testing procedures are specified in Reference Nonresidential Appendix NA7.6.

The lighting controls that require acceptance testing include:

- NA7.6.1 Automatic daylighting controls.
- NA7.6.2 Shutoff controls.
- NA7.6.3 Demand-responsive lighting controls.
- NA7.6.4 Lighting systems receiving institutional tuning power adjustment factor.
- NA7.6.5 Demand responsive controls for controlled receptacles.
- NA7.8 Outdoor lighting controls.

Automatic Daylighting Controls Acceptance Testing - NA7.6.1

This test is required when automatic daylighting controls are installed in nonresidential and hotel/motel buildings. General lighting within a daylit zone must be controlled by automatic daylighting controls per the requirements of Section 130.1(d).

Automatic daylighting controls must be tested according to NA7.6.1 and is restricted to certified lighting ATTs using the NRCA-LTI-03-A. This is to verify that the automatic daylighting controls are installed and that they automatically adjust electric lighting power in response to available daylighting in the space.

Shutoff Controls Acceptance Testing - NA7.6.2

All installed indoor lighting must be controlled by shutoff controls per Section 130.1(c). Shutoff controls acceptance testing ensures that occupant-sensing controls and automatic time-switch controls that are installed are functioning according to these requirements.

Automatic shutoff controls must be tested according to NA7.6.2 and is restricted to certified lighting ATTs using the NRCA-LTI-02-A to verify that occupant sensing controls and automatic time switch controls are functioning properly to achieve the desired lighting controls.

Occupant-sensing control acceptance testing verifies that the controls are installed per manufacturer's instructions and that the occupant-sensing control dims or turns lighting on or off according to occupancy in the space.

The automatic time-switch controls acceptance testing verifies that indoor lighting controlled by an automatic time-switch control turns lighting on and off according to a programmed schedule and that manual override controls turn lighting on during scheduled off periods.

Demand-Responsive Lighting Controls Acceptance Testing - NA7.6.3

This test is required when demand-responsive lighting controls are installed in nonresidential and hotel/motel buildings per the requirements of Section 130.1(e) and Section 110.12. Demand-responsive lighting controls are required for:

- Newly constructed buildings with general lighting power of 4,000 watts or greater.
- Lighting alterations and additions with general lighting power of 4,000 watts or greater.

Demand-responsive lighting controls must be tested according to NA7.6.2 and is restricted to certified lighting ATTs using the NRCA-LTI-04-A to verify that demand responsive controls can reduce lighting power of the building to at least 85 percent of full power. The test also confirms that the lighting system produces a uniform level of illumination during a demand response event.

Institutional Tuning Power Adjustment Factor Acceptance Testing - NA7.6.4

This test is required when institutional tuning controls are installed to qualify for a power adjustment factor in nonresidential lighting systems per Section 140.6(a)2J. Institutional tuning is the adjustment of the maximum light output of lighting systems to support visual needs or save energy. Institutional tuning differs from personal tuning in that the control strategy is implemented at the institutional rather than the individual user level, and maximum light-level adjustments are available only to authorized personnel.

Institutional tuning must be tested according to NA7.6.4 and is restricted to certified lighting ATTs using the NRCA-LTI-05-A to verify that the institutional tuning controls limit the maximum light output or power draw of the controlled lighting to 85 percent or less of full light output or full power draw.

Completion of this acceptance test certifies that lighting systems receiving the institutional tuning power adjustment factor (PAF) comply with Section 140.6(a)2J and NA7.6.4.

Demand-Responsive Controls for Controlled Receptacles - NA7.6.5

This test is required when demand-responsive controls for controlled receptacles are installed in nonresidential and hotel/motel buildings per the requirements in Section 130.5(d) and Section 110.12(e). Demand-responsive controls for controlled receptacles are required when the following conditions are met:

- Controlled receptacles are required per Section 130.5(d)
- The building is required to have demand-responsive lighting controls per Section 110.12(c)

Demand-responsive controls for controlled receptacles must be tested according to NA7.6.5 and is restricted to certified lighting ATTs using the NRCA-LTI-04-A to verify that demand-responsive controls can turn off all loads connected to controlled receptacles when a demand response signal is received.

Outdoor Lighting Controls Acceptance Testing - NA7.8

This test applies to outdoor lighting controls that include photocontrols, motion sensors, astronomical time-switch controls, and scheduling controls for outdoor lighting systems per the requirements of Section 130.2. These controls are required for nonresidential and hotel/motel buildings.

Outdoor lighting controls must be tested according to NA7.8 and is restricted to certified lighting ATTs using the NRCA-LTO-02-A to verify that all outdoor lighting regulated by Section 130.2(c) is controlled by a motion sensor, photocontrol, astronomical time-switch control, and automatic scheduling control, as required.

Covered Process Acceptance Testing Requirements

Please refer to Chapter 14.3.4 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Refrigerated Warehouse Acceptance Testing - NA7.10

Please refer to Chapter 14.3.4.1 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Commercial Kitchen Exhaust System Acceptance Testing - NA7.11

Please refer to Chapter 14.3.4.2 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Parking Garage Ventilation Acceptance Testing - NA7.12

Please refer to Chapter 14.3.4.3 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Compressed Air System Acceptance Testing - NA7.12

Please refer to Chapter 14.3.4.4 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Elevator Lighting and Ventilation Controls Acceptance Testing - NA7.14

This test is required for newly installed elevators in nonresidential and hotel/motel buildings per Section 120.6(f).

Elevator lighting and ventilation controls must be tested according to NA7.14 to verify that shut-off controls installed in an elevator cab turn lighting and ventilation fans off when the elevator is not occupied for more than 15 minutes and on when elevator cab operation resumes.

The control system must also be able to detect occupancy and keep the lighting and ventilation fan on, in the event that someone is occupying the elevator cabin and the elevator conveyance or doors malfunction.

Escalator and Moving Walkway Controls Acceptance Testing - NA7.15

Please refer to Chapter 14.3.4.6 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Lab Exhaust Ventilation System Acceptance Testing - NA7.16

This test is required for newly installed laboratory and factory exhaust systems with airflow greater than 10,000 cfm per Section 140.9(c) for compliance with the Energy Code requirements on laboratory heat recovery and exhaust fan power consumption.

For all laboratory exhaust systems with a VAV control controlled by occupancy sensors, the controls and turndown settings must be tested according to NA7.16 to verify that the occupied and unoccupied setpoints are in operation and correctly configured to limit excessive energy use, without sacrificing operator safety.

Fume Hood Automatic Sash Closure Acceptance Testing - NA7.17

Please refer to Chapter 14.3.4.8 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Steam Trap Fault Detection Acceptance Testing - NA7.19

Please refer to Chapter 14.3.4.9 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Transcritical CO_2 Systems Acceptance Testing - NA7.20

Please refer to Chapter 14.3.4.10 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Acceptance Test Technician Certification Provider (ATTCP)

Provider Qualifications

Please refer to Chapter 14.5.1 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Organizational Structure

Please refer to Chapter 14.5.1.1 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Certification of Acceptance Test Employers (ATE)

Please refer to Chapter 14.5.1.2 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Training and Certification Procedures

These requirements are the most significant of the ATTCP regulations. They encapsulate all the required training, testing, certification, and oversight for the ATTs and ATEs that the ATTCP must provide. These requirements describe the level of experience, education, professionalism, and accountability of the ATT that the CEC is seeking and that the ATTCP must enforce.

ATTCPs shall include with their application a complete copy of all training and testing procedures, manuals, handbooks, and materials. ATTCPs shall explain in writing how their training and certification procedures include, but are not limited to, the following (Section 10-103.1(c)3 et seq. and Section 10-103.2(c)3 et seq.):

Training Scope

The ATT training must include both classroom and laboratory training. In essence, the ATT must be instructed on all acceptance tests and then practice those instructions in a laboratory setting. Furthermore, the ATT must be educated on the general science regarding acceptance testing, as well as the procedure to complete and submit the correct acceptance test documents.

ATT Training

Curricula. ATTCP training curricula for lighting controls and mechanical ATTs shall include, but not be limited to, the analysis, theory, and practical application of the items listed in Section 10-103.1(c)3Bi and Section 10-103.2(c)3Bi, respectively. These include training on the acceptance tests themselves.

Several approved ATTCPs require extensive classroom training to accomplish this educational requirement. One approved ATTCP requires that each ATT applicant hold a third-party certificate of training that the CEC found to be equivalent to the curricula required.

Hands-On Training. The ATTCP shall describe in its application the design and technical specifications of the laboratory boards, equipment, and other elements that will be used to meet the hands-on requirements of the training and certification.

Prequalification. Participation in the certification program shall be limited to persons who have at least three years of professional experience and expertise in either lighting controls and electrical systems or mechanical systems, as determined by the ATTCP.

Professional experience is defined by the ATTCP but generally means experience in a professional occupation that provides training and work experience related to the systems subject to lighting controls or mechanical acceptance testing. The ATTCP must clarify the process that it will use to determine what experience is considered professional and relevant to either lighting controls or mechanical acceptance testing, as well as to what extent the ATTCP will verify that experience. The following are some relevant questions that the ATTCP should consider when establishing an ATT applicant's prequalified experience, though not specifically required by regulation:

- How is the experience documented (for example, letters from employers or other written evidence), and how is it related to lighting controls or mechanical acceptance testing requirements?
- Should professional experience be demonstrated by requiring applicants to be certified in specifically identified professions, such as:
    - California licensed electrical contractors.
    - California licensed mechanical or HVAC contractors.
    - California certified general electricians.
    - California licensed air conditioning repair contractors.
    - California licensed professional engineers.
    - Lighting control manufacturer representative.
    - Certified commissioning professionals.

- Other professional occupations that are demonstrated to provide industry-accepted training and work experience relevant to the systems subject to lighting control or mechanical acceptance testing.

ATTCPs may adopt additional prequalification requirements for ATT applicants. For example, an ATTCP may restrict applicants from participating in the training program if the applicant is decertified by other ATTCPs. Any such additional requirements are at the ATTCP's discretion and not required by the CEC.

Instructor-to-Trainee Ratio. The ATTCP shall document in its application to the CEC why its instructor-to-trainee ratio is sufficient to ensure the integrity and efficacy of the curriculum and program based on industry standards and other relevant information.

Typically, the instructor-to-student ratio for classroom training is much higher than for laboratory training. In the applications that the CEC has approved, classroom instructor to student ratios were between 1:25 and 1:35. For laboratory training, the ratios were between 1:6 and 1:12. Most important, each ATTCP application included a discussion of the basis for each ratio.

Tests. The ATTCP shall describe the written and practical tests used to demonstrate each certification applicant’s competence in all specified subjects. The ATTCPs shall retain all results of these tests for five years from the date of the test.

When developing and implementing both written and practical tests, the ATTCP may consider the following issues:

- Subject matter experts should validate contents of the exams.
- Pilot testing and statistical analysis by qualified psychometricians can identify poor quality questions and bias, as well as validating a passing score.
- Checking exam question response option frequency and other measurements of consistency may help validate the exam rigor and justify passing scores and performance standards.
- Exam questions should be evaluated annually to confirm reliability, rigor, and lack of bias.
- Lack of bias should be validated consistent with the Uniform Guidelines on Employee Selection Procedures (1978) (Federal Register, 43(166), 38290-38315).

Measures should be adopted to ensure exam security, such as having multiple versions of exams with random question generation and at least twice the number of questions in a validated question bank than are scored on any given test.

Recertification. The ATTCP shall recertify all ATTs before implementing each adopted update to the Energy Code when these updates affect the acceptance test requirements. Recertification requirements and procedures shall apply only to those specific elements that are new or modified in future updates to the Energy Code.

The ATTCP shall develop recertification training curricula for ATTs consistent with training requirements in Section 10-103.1(c)3A and Section 10-103.1(c)3B (or Section 10-103.2(c)3A and Section 10-103.2(c)3B) and shall submit the proposed recertification training curricula to

the CEC for review and approval in the update report required under Section 10-103.1(d)2 (or Section 10-103.2(d)2). Once approved, the ATTCP will implement the recertification process.

ATE Training

Training for ATEs shall consist of at least a single class or webinar consisting of at least four hours of instruction that covers the scope and process of the lighting controls or mechanical systems acceptance tests in the Energy Code.

Complaint Procedures

The ATTCPs shall describe in their applications to the CEC procedures for accepting and addressing complaints regarding the performance of any ATT or ATE certified by the ATTCP and explain how building departments and the public will be notified of these proceedings.

Decertification Procedures

The ATTCPs shall describe in their applications to the CEC procedures for revoking their certification of ATTs and ATEs based upon poor quality or ineffective work, failure to perform acceptance tests, falsification of documents, failure to comply with the documentation requirements of these regulations, or other specified actions that justify decertification. The ATTCP shall also describe its general procedures for decertified ATTs or ATEs seeking to regain their certification status, including eligibility requirements for recertification (if any).

Quality Assurance and Accountability

The quality assurance and accountability requirements for lighting controls and mechanical ATTCPs vary significantly for the Energy Code, so they will be discussed separately.

- Lighting Controls

  The ATTCP shall describe in its application to the CEC its procedures for conducting quality assurance and accountability activities, including, but not limited to, the following:

- The ATTCP shall include quality assurance and accountability measures, including, but not limited to, independent oversight of the certification materials, processes, and procedures; visits to building sites where certified technicians are completing acceptance tests; certification process evaluations; and expert review of the training curricula developed for Energy Code Section 130.4 and Section 160.5(e). Independent oversight may be demonstrated by accreditation under the ISO/IEC 17024 standard.
    - The ATTCP shall review a random sample of no fewer than 1 percent of each ATT's completed compliance forms.
    - The ATTCP shall perform shadow audits by meeting either of the following:
        - The ATTCP shall randomly select and shadow audit no less than 1 percent of each ATE's overseen projects, following the assigned ATT and observing their performance on the job site.
        - The ATTCP shall shadow audit each ATT at an ATTCP training facility at least once per code cycle where the ATTCP shall observe the performance of the ATT on at least five functional tests for which the ATT is certified. The shadow audit must replicate field conditions for installed equipment and controls in a building. The ATTCP training facility shall be set up to allow auditing of all functional tests for which

the ATT is certified. The shadow audits must be in addition to any testing used for ATT recertification.

The consequences of failed audits should be fully described by the ATTCP. ATTCPs might consider whether to require a higher percentage of document and on-site audits the first few years of operation to ensure that any initial issues with training or compliance are identified and addressed.

For example, one ATTCP proposed the following:

- For the first three years of operation, review a random sample of 6 percent of each technician's completed documents and perform on-site audits of 6 percent of acceptance tests.
- For years 4 and 5 of the ATTCP operation, review a random sample of 4 percent of each technician's completed documents and perform on-site audits of 4 percent of acceptance tests.
- After five years of operation, reduce a random sample of 2 percent of each ATT's completed compliance documents and perform on-site audits of 2 percent of acceptance tests.

- Mechanical Systems

  The ATTCP shall describe in its applications to the CEC procedures for conducting quality assurance and accountability activities, including, but not limited to, the following:

  - The ATTCPs shall include quality assurance and accountability measures, including, but not limited to, independent oversight of the certification materials, processes, and procedures; visits to building sites where ATTs are completing acceptance tests; certification process evaluations; building department surveys to determine acceptance testing effectiveness; and expert review of the training curricula developed for Energy Code Section 120.5 and Section 160.3(d).
  - The ATTCP shall review a random sample of no fewer than 1 percent of each ATT's completed compliance forms. The ATTCP shall also randomly select and shadow audit no fewer than 1 percent of each ATE's overseen projects, following the assigned ATT and observing his or her performance on the job site. Independent oversight may be demonstrated by accreditation under the ISO/IEC 17024 standard.

  The mechanical regulation generally follows the same requirements as lighting controls, except the focus for on-site audits is on the ATEs rather than the ATTs.

Certification Identification Number and Verification of ATT and ATE Certification Status

The ATTCP shall describe in its applications to the CEC procedures for recording, tracking, and communicating certification status, including but not limited to the following:

- Upon certification of an ATT or ATE, the ATTCP shall issue a unique certification identification number to the ATT or ATE.
- The ATTCP shall maintain an accurate public record of the certification status for all ATTs and ATEs that the ATTCP has certified, including any ATTs or ATEs who have been decertified as specified in Section 10-103.1(c)3E or Section 10-103.2(c)3E.

- The ATTCP shall provide verification of current ATT certification status upon request to authorized document registration provider personnel or enforcement agency personnel to determine the ATT's eligibility to sign certificate of acceptance documentation.

Energy Code compliance will also be simplified by requiring the ATT to include its assigned certification number on the compliance documentation, thereby allowing the enforcement agency and the CEC to track the effectiveness of this certification program.

The ATTCP is not required to implement an on-line presence of any kind for compliance with these regulations. However, the applications that the CEC has approved all include the implementation of an online presence to contend with the ATT/ATE application processing, complaints process, certification status, and ATT/ATE contact information.

Electronic Database System

The ATTCP shall maintain, or by suitable contractual requirements cause to be maintained, an electronic database system approved by the CEC. The electronic database system shall be capable of all the following:

- Support all activities for the ATTCP to comply with its quality assurance program as required by Section 10-103.1(c)3F.
- For no less than five years, record and preserve all certificates of acceptance offered for certification by the ATTCP and as performed by its own certified ATTs.
- Allow the transmission of electronic copies of each completed certificate of acceptance to the ATT that performed the test, the ATE associated with that ATT, or both.
    - Each page of each certificate of acceptance shall bear the logo of the ATTCP or other identifying insignia as approved by the CEC.
    - The electronic copy shall be capable of being printed.
    - The ATTCP may apply to the CEC for approval to use alternative compliance documents that differ from those approved for use by the CEC but must demonstrate that these alternative compliance documents do not differ in format, informational order, or content from approved compliance documents.
- Provide a means of verifying any certificate of acceptance to the enforcement agency having jurisdiction as identified on the certificate of acceptance.
- Provide the CEC with any of the following project data or documents upon request: project address, permit numbers, ATT and ATE certification numbers, certificates of acceptance, compliance forms, installation forms, and record of quality assurance review. The CEC may adopt an Application Programming Interface (API) for providing data electronically. Within one year of development of an API, the ATTCP's electronic database system shall have the ability to transfer project data to the CEC through the API upon completion of the project or at established intervals no longer than monthly.

Compliance Document Recording and Repository Reporting Requirement

- The ATTCP shall record all certificates of compliance (Section 10-103(a)1), certificates of installation (Section 10-103(a)3), and certificates of acceptance (Section 10-103(a)4)

associated with any acceptance test specified in Section 130.4, Section 160.5(e), Section 120.5, and 160.3(d).

- Contingent upon CEC approval of the threshold (Section 10-103.1(b) or Section 10-103.2(b)) and upon availability and approval of an electronic document repository by the Executive Director, the ATTCP shall submit monthly data transfer packets to the CEC to an electronic document repository for retention consistent with CEC instructions.

Requirements for ATTCPs to Provide Regular Reports

Please refer to Chapter 14.5.2 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Annual Report

Please refer to Chapter 14.5.2.1 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Update Report

Please refer to Chapter 14.5.2.2 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Amendment of ATTCP Applications

Please refer to Chapter 14.5.3 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Amendment Scope

Please refer to Chapter 14.5.3.1 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Amendment Review

Please refer to Chapter 14.5.3.2 of the *2022 Nonresidential and Multifamily Compliance Manual*.