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NATIONAL ENERGY MANAGEMENT INSTITUTE COMMITTEE

2019 Amendment (Substantive Changes) to Application for Nonresidential Mechanical Acceptance Test Technician Certification Provider under California Code of Regulations
2019 Title 24, Part 1, Article 1, Section 10-103.2, As Well As Part 6, Sections 120.5

1st Submittal

31 March, 2019

Notice

National Energy Management Institute Committee

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Preface

The National Energy Management Institute Committee (NEMIC), in partnership with the International Training Institute for the Sheet Metal Industry (ITI) and the National Energy Management Institute (NEMI), is submitting this amendment to the application for nonresidential mechanical acceptance test training and certification provider under California Code of Regulations 2019 Title 24, Part 1, Article 1, Sections 10-102 and 10-103.2, as well as Part 6, Sections 120.5 ("Application").

The Application has been submitted and accepted previously, the most recent version dated 27 February 2015 and approved by the CEC on March 11, 2015. This Amendment with Substantive Changes is submitted as reference to that document, under Section 10-103.2(f)1.B.ii. All sections of the Application are submitted with the 2019 Substantive Change Amendment (this document), along with the affected Attachments.

This Amended ATTCP Application incudes three substantive changes, along with some non-substantive editorial and grammatical cleanup. The substantive changes include:

Adjustment of Training and Exams for the 2019 California Building Energy Efficiency Standards
Mechanical Acceptance Test Employer Training (Attachment 2.2), Mechanical Acceptance Test Employer Exam (Attachment 2.3), Mechanical Acceptance Test Technician Training (Attachment 3.2), and Mechanical Acceptance Test Technician Exams (Attachment 3.4) have all been adjusted to meet the changes of the 2019 Standards. All Training and Exam Attachments are submitted under separate cover with Repeated Application for Confidential Designation. Descriptions of the changes are included with the Attachments.

Update of the Quality Assurance Program (QAP)
The active NEMIC Quality Assurance Program (QAP) was submitted with the NEMIC 2016 Update Report (QAP) and approved by the CEC on June 13, 2018. The only substantive change from the approved QAP document to the language included with this Substantive Change Amendment (Section 6, Quality Assurance Program) is *Table 6.5, Results of Audit Failure*, which was adjusted to better align with the CEC-approved practices of other ATTCPs. Because the QAP was submitted as a stand-alone section with the 2016 Update Report, it appears in its entirety as a newly-inserted section with this 2019 Substantive Amendment to the 2013 NEMIC ATTCP Application.

Introduction of two levels of Mechanical Acceptance Test Technician (MATT)
To better meet the demand of the industry as Acceptance Test Technician certification for Mechanical Acceptance Testing becomes required, the NEMIC ATTCP proposes to provide two levels of Mechanical Acceptance Test Technician (MATT Level 1 and MATT Level 2). MATT Level 1 is certified to perform a specified subset of the most common mechanical acceptance tests, while MATT Level 2 is certified to perform all mechanical acceptance tests. The scopes, eligibility, training, and certification exams for MATT Level 1 and MATT Level 2 presented with this Substantive Change Amendment are as discussed in a meeting with CEC staff on December 13, 2018. The scopes for MATT

Level 1 and MATT Level 2 are detailed in Section 3 Training and Certification Procedures for Acceptance Test Technicians of this Substantive Change Amendment.

The new dual certification requirement is intended to allow for a significant expansion of the number of certified mechanical test technicians for the most common types of mechanical acceptance tests, while providing a more comprehensive and higher standard of training for the less common and more specialized types of acceptance tests. This dual certification has precedence in the Commission's prior approval of other Mechanical ATTCP programs that provide for certification of mechanical acceptance test technicians for each individual acceptance test, rather than certifying the technician to perform all tests. The NEMIC website and certification numbers will clearly indicate whether a technician is MATT-1 or MATT-2 certified. The NEMIC quality assurance procedures will ensure that MATT-1 technicians do not perform or submit acceptance tests for which they are not certified.

NEMIC is confident that, even with these changes, our program will remain the most rigorous ATTCP program approved by the Commission. NEMIC's currently-approved application requires all NEMIC-certified mechanical acceptance test technicians to also be ICB-certified TABB testing, adjusting, and balancing technicians. This requirement greatly exceeded the qualification requirements of any other approved ATTCP. The dual certification continues to require MATT-2 technicians to also be ICB-certified TABB testing, adjusting, and balancing technicians. MATT-1 technicians are not required to be ICB-certified TABB Technicians, but still must demonstrate they have the relevant experience and expertise necessary to be eligible to take the exam for certification as a MATT-1. The MATT-1 prequalification requirements meet or exceed Commission requirements and the requirements of other approved mechanical ATTCPs.

The change to a dual certification system will have no impact on current NEMIC-certified ATTs or Acceptance Test Employers (ATEs). All current NEMIC-certified ATTs meet the requirements for MATT-2 certification. The only change will be clarification that their certification number indicates they are MATT-2 certified and can perform all mechanical acceptance tests.

All other changes are minor (non-substantive) in nature, with full underline and strikeout copy submitted with the Substantial Change Amendment as required under Section 10-103.2(f)1.B.iii.

A detailed summary of all changes to the NEMIC ATTCP Application and affected Attachments is submitted concurrent with this Substantive Change Amendment to the NEMIC ATTCP Application, as required under Section 10-103.2(f)1.B.i. The NEMIC ATTCP Certification Manual (Attachment 2.1) is updated to reflect the Substantive Changes of this Amendment and is submitted with the Amendment Application as a public document. The summaries for the remaining Attachments submitted with requests for confidentiality are included with those Attachments under cover.

This document contains information that NEMIC and its partners, ITI and NEMI, consider to be of proprietary and confidential nature. Parts of this application are submitted to the CEC docket unit with requests for confidentiality in accordance with California Code of Regulations Title 20 § 2505 et seq. All previous requests have been granted.

All questions regarding this application should be addressed to:

ATTCP Administrator
National Energy Management Institute Committee
8403 Arlington Blvd, Suite 100
Fairfax, VA 22031
703.739.7100

Contents

Definitions

ANSI .....American National Standards Institute

Application.....As used here refers to this document in its entirety as well as all supporting materials provided under the cover of this document or under separate cover pertaining to this document

ATE.....Acceptance Test Employer; see also Mechanical Acceptance Test Employer (MATE), a specific type of Acceptance Test Employer

ATT.....Acceptance Test Technician; see also Mechanical Acceptance Test Technician (MATT), a specific type of Acceptance Test Technician

ATTCP.....Acceptance Test Technician Certification Provider

Certificate of Completion.....Certificates of attendance or participation are provided to individuals, here ATE or ATT, who have attended or participated in classes, courses, or other education/training programs or events (National Commission for Certifying Agencies' *Standards for the Accreditation of Certification Programs*).

Certification.....A voluntary process by which individuals, here ATE or ATT candidates, are evaluated against predetermined standards for knowledge, skills, or competencies. Participants who demonstrate that they meet the standards by successfully completing the assessment process are granted a time-limited credential. To retain the credential, certificants must maintain continued competence. The credential awarded by the certification program provider denotes that the participant possesses particular knowledge, skills, or competencies. (National Commission for Certifying Agencies' *Standards for the Accreditation of Certification Programs*)

CCR.....California Code of Regulations

Data Registry ...Web service with a user interface and database maintained by a Registration Provider that complies with the applicable requirements in the Title 24 Reference Joint Appendix JA7 and provides for registration of residential or nonresidential compliance documentation used for demonstrating compliance with California Code of Regulations Part 6. In this document it is referred to as the Registry.

Database .....Body of information and information system provided by NEMIC to meet the Data Registry requirements of Title 24 Reference Joint Appendix JA7

ICB.....International Certification Board, a function of NEMIC

ISO .....International Standards Organizations

ITI.....International Training Institute

JATC .....Joint Apprenticeship Training Center

MATE.....Mechanical Acceptance Test Employer, an Acceptance Test Employer certified by the ATTCP to meet Mechanical Acceptance Test Employer requirements

MATT.....Mechanical Acceptance Test Technician, an Acceptance Test Technician certified by the ATTCP to perform Mechanical Acceptance Tests.

NEMI .....National Energy Management Institute

NEMIC .....National Energy Management Institute Committee

Registry .....Term used in this document to reference the Data Registry as defined in Reference Joint Appendix JA-7, see also Data Registry.

SMACNA.....Sheet Metal and Air Conditioning Contractors' National Association

SMART.....International Association of Sheet Metal, Air, Rail Transportation Workers (SMART)

SME .....Subject matter expert

Standards .....Current California Building Energy Efficiency Standards

TAB.....Testing, adjusting and balancing

TABB.....Testing, Adjusting and Balancing Bureau, a function of NEMIC

1. Organization of the NEMIC ATTCP

This section addresses CCR Title 24 Part 1 Section 10-103.2(c)1, i.e., document organizational structure of the ATTCP applicant, including explanations of the organization type, by-laws, and ownership structure.

This section was previously submitted with the date 27 February 2015.and approved by the CEC on March 11, 2015. Only non-substantive changes to this section are submitted with the 2019 Substantive Change Amendment.

1.1 Structure of the NEMIC ATTCP

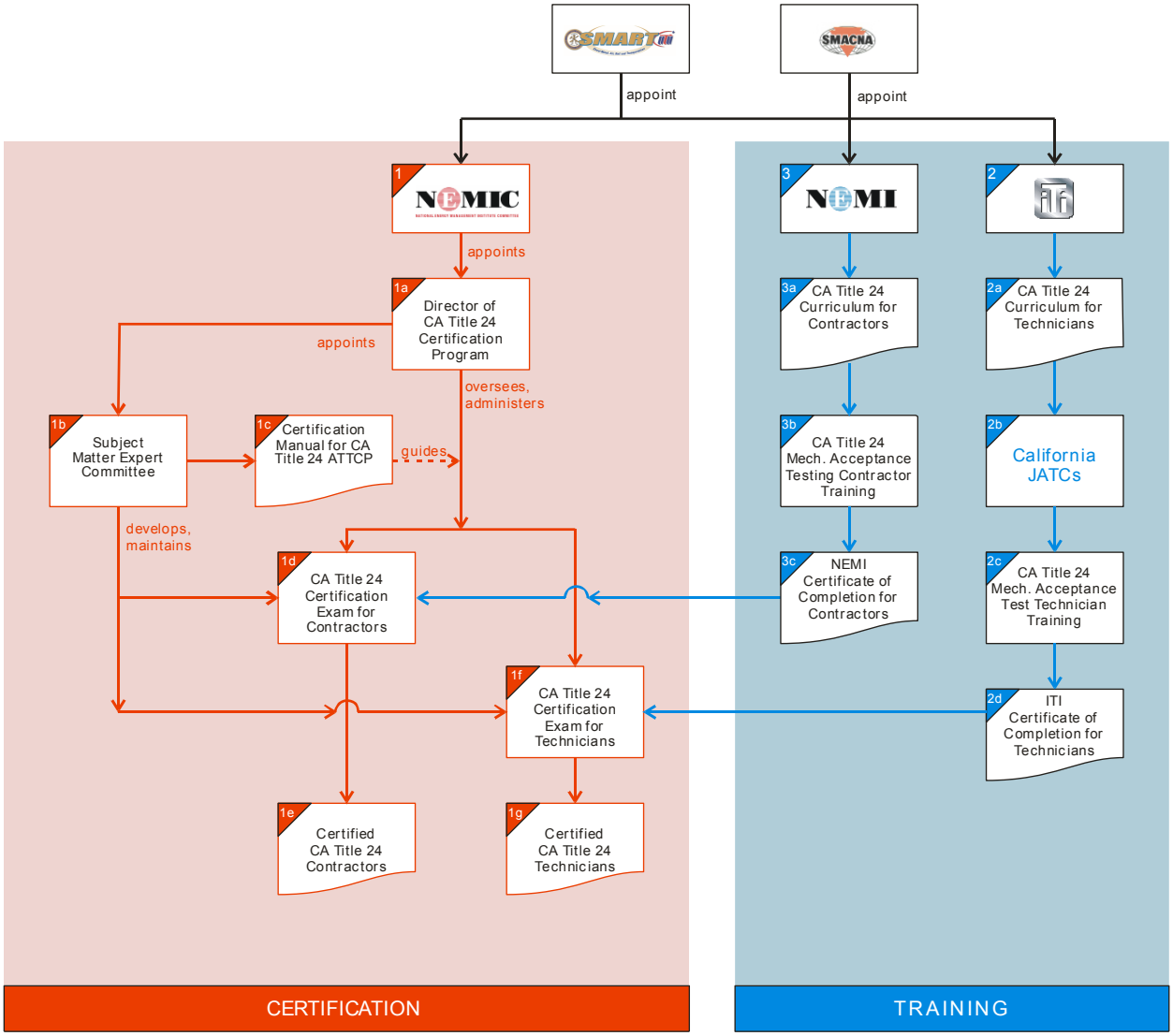
The structure of the NEMIC ATTCP is designed to meet the requirements of CCR Title 24 Part 1 Section 10-103.2(c)3F, i.e., organizational structure that assure quality, independent oversight and accountability, while also meeting the generally accepted definition of a certification program particularly as it conforms to ISO/IEC 17024[1]. ISO/IEC 17024 certification program standards require training and certification to have organizational separation. Accordingly, the NEMIC ATTCP application identifies separate organizational entities to provide training and a "Certificate of Completion" and to provide "certification." The following table depicts the differences between a certification and a certificate of completion and how it is applied to the NEMIC ATTCP.

Certification	Certificate of Completion
Results from an assessment process, here the NEMIC certification exams for both ATEs and ATTs	Results from an educational process, here the ITI and NEMI classes for ATTs and ATEs respectively
Indicates mastery /competency	Indicates completion of a course (s), here training classes by ITI (for ATTs) and NEMI (for ATEs)
Standards set through a defensible, formal process (ISO 17024)	Course content set a variety of ways, here pre-requisite knowledge, classroom and hands-on training
Typically requires some amount of professional experience, here minimum of 3-years of relevant experience	For both newcomers and experienced professionals, here TABB-certification is pre-requisite
Awarded by a third-party, standard-setting organization, here NEMIC	Awarded by training and educational programs or institutions, ITI and NEMI
Has on-going requirements to maintain	Is the end result
What ATEs and ATTs receive after successfully passing their respective certification exams	What ATEs and ATTs receive after completing the NEMI or ITI classes

[1] International Standards Organization. 2012. ISO/IEC 17024 *Conformity assessment – General requirements for bodies operating certifications of persons*.

NEMIC will grant **certifications** to the ATEs and ATTs, while its partners ITI and NEMI will issue *certificates of completion*.

The structure and basic workflow of the NEMIC ATTCP and its training partners is depicted in the following diagram:



Structure and Basic Workflow of the NEMIC ATTCP

A detailed explanation of the structure and principal workflow is given below.

1 NEMIC is overseen by a Board of Trustees, half of which are appointed by SMACNA and half by SMART

1a The NEMIC Trustees appoint a director to head the California Title 24 Acceptance Test Certification Program.

1b The Director appoints the Subject Matter Expert Committee members. The task of the SME committee is to develop and maintain the certification program, including developing the Certification Manual as well as the certification examinations for both the ATEs and ATTs.

1c The SME Committee develops and maintains the Certification Manual for the California Title 24 ATTCP Program. The Manual sets forth the rules and regulations that ATEs and ATTs must follow to get certified and to maintain their certifications.

1d The Director administers the certification examination for ATEs following the rules and regulations set forth in the Certification Manual.

1e The ATE candidates will be issued a certification document once they successfully pass the certification examination for ATEs.

1f The Director administers the certification examination for ATTs following the rules and regulations set forth in the Certification Manual.

1g The ATT candidates will be issued a certification document once they successfully pass the certification examination for ATTs.

ICB and TABB are functions of NEMIC. Both maintain the certification programs for NEMIC. The TABB certification for TAB technicians and supervisors is American National Standards Institute (ANSI) accredited under ISO 17024 (ANSI Accreditation 0728). With the 2019 Substantive Amendment, NEMIC offers two levels of Mechanical Acceptance Test Technician Certification. A prerequisite for MATT Level 2s to be certified under the NEMIC ATTCP is that they must be TABB-certified. The TABB program's ANSI-ISO 17024 accreditation requires separation of training or teaching functions from the certification program. Thus, the training for ATEs and ATTs is developed and provided by NEMI and ITI respectively.

2 ITI produces a standardized sheet metal curriculum supported by a wide variety of training materials including instructor manuals, student textbooks and workbooks, videos, DVDS, CD-ROMS, and online training.

2a ITI develops and maintains the training materials for the CCR Title 24 acceptance testing program for ATTs.

2b ITI delivers the actual training via multiple JATCs located throughout California. JATCs constitute the local training facilities through which ITI delivers its classes. The facilities provide hands-on-training in state-of-the art labs as well as classroom instructions.

2c The local JATC delivers the Title 24 ATTCP training for ATT candidates. The training consists of self-paced training modules, classroom review and hands-on training in laboratories.

2d Once the ATT candidate successfully completes all training modules, they will be issued a Certificate of Completion. Only then will the candidate be able to take the certification exam for ATTs.

NEMI is an independent contractor to NEMIC and provides training to supervisors and contractors (employers). For the same reasons that ITI will train ATTs, NEMI will train ATEs.

3 NEMI provides training to supervisors and contractors, here ATEs

3a NEMI develops and maintains the training materials for the CCR Title 24 acceptance testing program for ATEs.

3b NEMI delivers the training for the ATE candidates as mandated by CCR Title 24 Part 1 Section 10-103.2(c)3C.

3c Once the ATE candidate successfully completes the training, they will be issued a Certificate of Completion. Only then will the candidate be able to take the certification exam for ATEs.

1.2 By-laws

NEMIC is joint labor management trust, which is tax exempt under Code Section 501(c) (6). The NEMIC trustees also are appointed half by SMACNA and half by SMART. A copy of the Trust Agreement is attached (Attachment 1.1).

ITI is an Employee Retirement Income Security Act (ERISA) welfare plan and is tax exempt under Internal Revenue Code Section 501(c)(3). ITI assets are held in Trust, which is administered by a joint board of trustees, half of whom are appointed by SMACNA and half by SMART. A copy of the Trust Agreement is attached (Attachment 1.2). The Board of Trustees is responsible for the administration of the ITI.

NEMI is a Non-Profit corporation. NEMI is governed by a Board of Directors, half of whom are appointed SMACNA and half by SMART. The Articles of Incorporation are attached (Attachment 1.3).

1.3 NEMIC Structure

NEMIC's mission is to develop business opportunities for contractors and its smart workforce in a green environment. NEMIC has two certification bodies: the International Certification Board and the Testing, Adjusting and Balancing Bureau. The charters of the ICB and TABB are attached (Attachment 1.4 (ICB & Attachment 1.5 (TABB)).

The organizational structure of NEMIC is diagrammed on the following page, with description below:

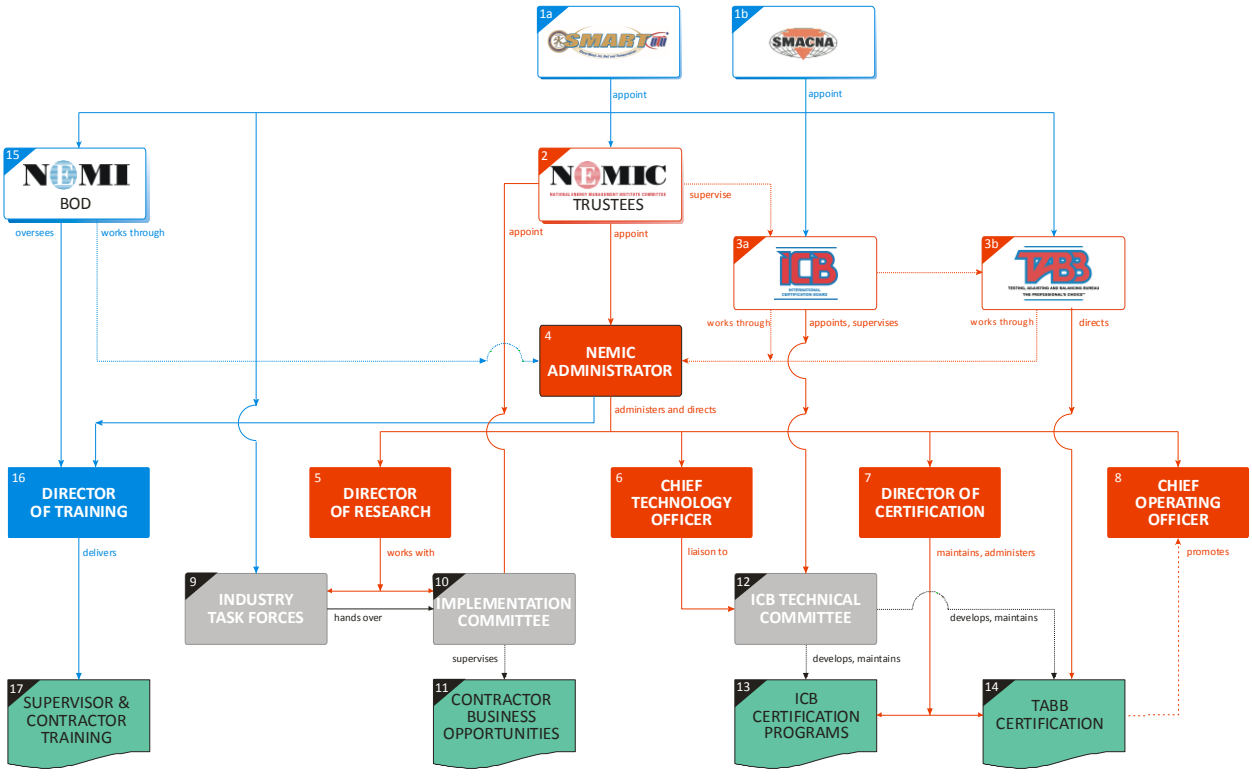
1 NEMIC is a joint labor management trust. Half of the NEMIC trustees are appointed by SMACNA (1b) and the other half by SMART (1a).

2 The NEMIC trustees appoint the NEMIC Administrator. SMACNA and SMART also appoint members to the ICB Board and TABB Board. ICB and TABB are two functions of NEMIC.

3a ICB is a function of NEMIC. ICB's business is managed by a Board of six (6) members, three of which are be appointed by SMART and three by SMACNA. The ICB is at all times responsible to and supervised by the Trustees of NEMIC. The mission of the ICB is to direct and implement a comprehensive set of certification programs to assure customers of the sheet metal industry of the quality advantages of utilizing persons or entities certified by the ICB. The ICB appoints and oversees the ICB Technical Committee, which is in charge of developing and maintaining the ICB and TABB certification programs.

3b TABB is a function of NEMIC. TABB's business is managed by a Board of six (6) members, three of which are be appointed by SMART and three by SMACNA. TABB is at all times responsible to and supervised by the ICB. The purpose of TABB is to direct and implement a comprehensive certification program of testing, adjusting and balancing contractors and personnel who are eligible for certification under TABB requirements.

ICB and TABB Boards work through the NEMIC Administrator.



Organizational Schematic of NEMIC

4. The NEMIC administrator works with the ICB, TABB and NEMI and administers and oversees its activities. There are four major activities of NEMIC each directed by a responsible person.

5. The Director of Research oversees the direction, operational performance and external relationships of the Industry Task Forces and the Implementation Committee and their work plans.

6. The Chief Technology Officer serves as the technical expert for NEMIC. The CTO leads NEMIC's technology team that identifies new technologies, market developments and trends that will affect skill sets of technicians and contractors. They also serve as the liaison to the ICB Technical Committee.

7 The Director of Certification performs duties and responsibilities within the guidelines established by the International Certification Board. They oversee the direction, operational performance and external relationships of the program's work plans. They supervise and coordinate office staff activities relating to certification issues including policies and procedures for new certifications, changes to existing certifications, and renewal of existing certifications and data base training.

8. The TABB Chief Operating Officer is responsible for implementation of policies and procedure to TABB. They assume the lead position in promoting TABB to the HVAC industry, national and local level tradeshows and local conventions within the HVAC industry. They seek speaking engagements where TABB can be promoted to HVAC engineers and specifiers of construction documents.

9. The Industry Task Forces are convened on an as-needed basis. Their members are appointed in equal number by SMART and SMACNA. Their task is to explore emerging markets for contractors and employment opportunities for the smart workforce.

10. The Implementation Committees are convened on an as-needed basis. Their task is to implement the business opportunities identified by the Industry Task Forces. Their task is to assist contractors to promptly enter an emerging market.

11. The final output of the work of an Implementation Committee is a detailed plan how to enter an emerging market.

12 The ICB Technical Committee is charged with the development and maintenance of the various ICB/TABB certification programs. It consists of six subject matter experts appointed by the ICB.

13 The output of the ICB Technical Committee is a series of certification exams specific to several specialty areas including the TABB certification exams for TAB technicians and TAB supervisors.

14. The TABB certification was designed for the sole purpose of providing the HVAC Industry ANSI-accredited testing, adjusting and balancing certification under ISO/IEC 17024 Standard.

15 NEMI is an independent contractor to NEMIC. Its major task is to provide training to supervisors and contractors. At this time, the NEMI Board has elected to work through the NEMIC Administrator in coordinating the training needs of HVAC industry it serves.

16 NEMI is run by the Director of Training who works under the NEMIC Administrator.

17 NEMI's deliverable is training for supervisors and contractors.

2 Certification of Acceptance Test Employers

This section addresses CCR Title 24 Part 1 Section 10-103.2(c)2, i.e., documents how the NEMIC program includes certification and oversight of Acceptance Test Employers to ensure quality control and appropriate supervision and support for Acceptance Test Technicians.

This section was previously submitted with the date 27 February 2015 and approved by the CEC on March 11, 2015 Substantive Changes are made to this Section with the 2019 Substantive Change Amendment.

2.1 Certification Process for Acceptance Test Employers

The certification process for Acceptance Test Employers (ATEs), including Mechanical Acceptance Test Employers (MATEs) has two components:

1. Requirement for training in regards to CCR Title 24 Part 1 Section 10-103.2(c)3C as a prerequisite to take the (Mechanical) Acceptance Test Employer Certification exam
2. Passing of the said certification exam

A copy of the NEMIC ATTCP Certification Manual which describes all the procedures regarding certification of ATTs and ATEs is found in Attachment 2.1. This is a public document and is posted on the ATTCP website. The Certification Manual ("Manual") also lists several eligibility requirements which the ATE must meet to be able to take the ATE certification exam (see Section 4.4 of the said Manual).

A copy of the Certification Exam for Mechanical Acceptance Testing Employers has been submitted to the CEC Docket Unit under separate cover with a request for confidentiality.

A copy of the required Acceptance Testing Employer Training Materials as mandated per CCR Title 24 Part 1 Section 10-103.2(c)3C has been submitted to the CEC Docket Unit under separate cover with a request for confidentiality.

2.2 Roles and Responsibilities of the individual Mechanical Acceptance Test Employer (MATE)

The role of the MATE is to understand the responsibilities of an employer performing Mechanical Acceptance Test work with NEMIC-certified MATTs. In addition, the MATE is responsible for registering the contractor on the NEMIC ATTCP database.

An employer may have multiple individuals certified as MATEs on staff; however, only one MATE registers the employer on the NEMIC ATTCP database. Each NEMIC-certified MATE registered on the database must also have at least one NEMIC-certified MATT on staff.

For clarification, the MATE may also be the Responsible Person as defined by the Standards, but only if eligible under Division 3 of the Business and Profession Code in the applicable classification. The NEMIC ATTCP does not assess qualifications of any individual to become or bear the responsibilities of the Responsible Person as defined by the Standards.

2.3 Employer Certification Obligations and Code of Conduct

Each NEMIC-certified Acceptance Test Employer, including Mechanical Acceptance Test Employers, by virtue of their certification must meet a number of obligations and must adhere to the Code of Conduct as spelled out in the Certification Manual to maintain their certification (see pertinent Section 4.7 *Employer Certification Obligations and Code of Conduct* in the Certification Manual). The objective of the Certification Obligations and the Code of Conduct is to maintain a high level of performance by the Employer throughout the life of their certification. The Obligations section also addresses business operations issues and is designed to provide a high degree of confidence with building code officials and building owners regarding how the Employers meet their business responsibilities. If the Employer or their Technician fails in their obligations or is deficient in their business conduct, the affected parties, i.e., all entities involved in a specific building project, such as the building owner, mechanical systems designer, or general contractor, have the option of filing a complaint with NEMIC as outlined in the Certification Manual.

Quality assurance is provided to all parties involved in a project by virtue of the process of certification of Acceptance Test Employers and their Technicians. In particular

- NEMIC's ATTCP Certification process is independent from other entities, conflicting interests and conflicting activities.
- NEMIC's ATTCP Certification process is impartial. NEMIC does not provide certification training or education or related services to applicants. Training of Technicians is provided by the International Training Institute and training of Employers is provided by the National Energy Management Institute. The certification exams for both Technicians and Employers are developed by a Subject Matter Expert Committee under NEMIC.
- NEMIC's ATTCP Certification process operates in an open and transparent manner. All policies and procedures will be posted on its website for review by interested parties.

3 Training and Certification Procedures for Acceptance Test Technicians

This section addresses CCR Title 24 Part 1 Section 10-103.2(c)3A, B, and C:

- Provide a complete copy of all training and testing procedures, manuals, handbooks and materials
- Document how the NEMIC training and certification procedures include both hands-on experience and theoretical training for Acceptance Testing Technicians (ATT).
- Document pre-qualification criteria for ATTs

With the 2019 Substantive Change Amendment, NEMIC provides two levels of Mechanical Acceptance Test Technician Certifications.

A NEMIC Certified Mechanical Acceptance Test Technician is one who is knowledgeable about Mechanical Acceptance Testing as required by the Standards. The MATT performs the acceptance verification reported on the Certificate of Acceptance (Field Technician).

A NEMIC-certified MATT Level 1 performs the work described above for the Mechanical Systems Acceptance Tests listed in Section 10-103.2(1)B of the Standards. Beginning with the 2019 Standards, the NA7.5.17 Occupied Standby Acceptance will also be included as part of the MATT Level 1 scope.

For clarification, for the 2016 Standards the MATT Level 1 Scope includes the following eight (8) Mechanical Acceptance Tests:

i. NA7.5.1 Outdoor Air Ventilation Systems
ii. NA7.5.2 Constant Volume, Single Zone Unitary Air Conditioners and Heat Pumps
iii. NA7.5.4 Air Economizer Controls
iv. NA7.5.5 Demand Control Ventilation Systems
v. NA7.5.6 Supply Variable Flow Controls
vi. NA7.5.7, NA7.5.9 Hydronic System Variable Flow Controls
vii. NA7.5.10 Automatic Demand Shed Controls

Beginning with the 2019 Standards, the NA7.5.17 Occupied Standby Acceptance will also be included as part of the MATT Level 1 scope. The MATT Level 1 scope will otherwise concur with any changes to Section 10-103.2(b)1.B of the Standards after 2019.

A NEMIC-certified MATT Level 2 performs the work described above for all the Mechanical Systems Acceptance Tests listed in section 120.5 of the Standards, including Duct Leakage Testing as referenced in Nonresidential Appendix NA1.9.

For clarification, for the 2016 Standards the MATT Level 2 scope includes the following (18) Mechanical Acceptance Tests:

1. NA7.5.1 Outdoor air ventilation systems (MATT Level 1 & 2)
2. NA7.5.2 Constant-Volume, Single Zone Unitary Air Conditioners and Heat Pumps (MATT Level 1 & 2)
3. NA7.5.3 Duct Systems as required by the Standards (MATT Level 2 only)
4. NA7.5.4 Air Economizer Controls (MATT Level 1 & 2)
5. NA7.5.5 Demand Control Ventilation Systems as required by the Standards (MATT Level 1 & 2)
6. NA7.5.6 Supply Variable Flow controls (MATT Level 1 & 2)
7. NA7.5.7, NA7.5.9 Hydronic System Variable Flow Controls (MATT Level 1 & 2)
8. NA7.5.7 Boiler and/or Chiller Isolation (MATT Level 1 & 2)
9. NA7.5.8 Hydronic Systems Supply Temperature Reset Controls (MATT Level 2 only)
10. NA7.5.10 Automatic Demand Shed Controls (MATT Level 1 & 2)
11. NA7.5.11 Fault Detection and Diagnostics (FDD) for Air Handling Units and Zone Terminal Units (MATT Level 2 only)
12. NA7.5.12 Automatic Fault Detection and Diagnostics (FDD) for Air Handling Units and Zone Terminal Units (MATT Level 2 only)
13. NA7.5.13 Distributed Energy Storage DX AC Systems (MATT Level 2 only)
14. NA7.5.14 Thermal Energy Storage (TES) Systems (MATT Level 2 only)
15. NA7.5.15 Supply Air Temperature Reset Controls (MATT Level 2 only)
16. NA7.5.16 Water-cooled Chillers served by Cooling Towers with Condenser Water Reset Controls (MATT Level 2 only)
17. Part 6 as applicable Energy Management Controls System (MATT Level 2 only)

Beginning with the 2019 Standards, MATT Level 2 scope will also include:

18. NA7.5.17 Occupant Sensing Zone Controls (MATT Level 1 and 2)

Beginning with the 2019 Standards, Item 3. NA7.5.3 Duct Systems as required by the Standards (MATT Level 2 only) will include Duct Leakage Test Verification services normally provided by a

Home Energy Rating System (HERS) rater. Item 17. Energy Management Controls Systems will be tested according to NA7.7.2 The MATT Level 2 scope will otherwise concur with any changes to Section 10-120.5 of the Standards after 2019.

Certification of Mechanical Acceptance Test Technicians and Mechanical Acceptance Test Employers is documented in the NEMIC ATTCP Certification Manual (Attachment 2.1)

3.1 Pre-qualifying Technician Training

Mechanical Acceptance Test Technician (MATT) Level 1

Technicians who wish to become certified by NEMIC as Mechanical Acceptance Test Technicians (MATT) Level 1 must have a minimum of 3 years of professional experience and expertise in mechanical controls and systems, as determined by NEMIC, and meet one of the following three criteria:

1. Applicant is currently enrolled in a state-approve SMART apprenticeship program and can pass a written qualification examination.
    a. The qualification examination is designed to show that the applicant's professional experience has provided them with the knowledge base required to perform the Mechanical Systems Acceptance Tests listed in Section 10-103.2(b)1.B of the Standards
2. Applicant has attained SMART journeyperson status and can pass a written qualification examination.
    a. The qualification examination is designed to show that the applicant's professional experience has provided them with the knowledge base required to perform the Mechanical Systems Acceptance Tests listed in Section 10-103.2(b)1.B of the Standards
3. Applicant is an ICB-certified TABB Technician with at least three years of relevant professional experience and expertise in mechanical controls and systems. The Qualification Exam is not required for an ICB-certified TABB Technician because the process to become TABB certified verifies their relevant professional experience. More information about the requirements to become an ICB-certified TABB Technician can be found at the www.icbcertified.org website under the Resources section, within the Certification Manual for Technicians, also included as Attachment 3.1 to this Application (previously submitted).

All applicants for MATT Level 1 certification who meet one of the above criteria must also meet both of the following requirements:

1. Be an individual with respect to whom contributions are payable to the NEMIC; or is another individual who qualifies as a NEMIC Participant.

2. Hold an ITI certificate of completion of having received training on mechanical acceptance testing mandates and procedures as specified by the latest version of the California Building Energy Efficiency Standards as they pertain to the MATT Level 1 scope.

Mechanical Acceptance Test Technician (MATT) Level 2

TAB technicians who wish to become certified by NEMIC as a Mechanical Acceptance Test Technician Level 2 (formerly simply an ATT) must be TABB-certified[2]. TABB-certification requires that the applicant meets the following qualifications as detailed in the ITI Certification Manual for Technicians (a copy of the Manual is found in Attachment 3.1):

- *"Passed both the written and performance tests as set forth in Section 2.3 of this Manual.*
- *Demonstrated TAB standards of proficiency as set forth in this Manual. "*[3]

As indicated above the certification exam has both a written and a performance component. The written exam is five (5) hours long and covers all the standards of proficiency as outlined in the ITI Certification Manual for Technicians. The candidate must pass the written exam before they can take the performance exam. The performance exam consists of two 4-hour sessions. The first session focus on airside systems, while the second one addresses hydronic systems. These are hands-one exams where the candidates are required to test, adjust and balance small model systems which replicate the features and intricacies of large commercial HVAC systems.

The ICB-certified TABB Technician Certification is an ANSI-rated program.

TAB technicians who wish to be TABB-certified require a minimum of three years of hands-on (on job) training. Generally, the candidates have more years of hands-on training than the required minimum. In addition to the hands-on training, the candidates will have taken classroom training sessions. The following table lists the standards of proficiency (knowledge base) as detailed in the ITI Certification Manual and compares them to the topics listed in CCR Title 24 Part 1 Section 10-103.2(c)3B.

[2] NEMIC ATTCP Certification Manual
[3] International Training Institute Certification Manual for Technicians

	Curricula Topics Listed In CCR Title 24 Part 1 Section 10-103-B(C)3B																			
Standards Of Proficiency (Knowledge Base) As Detailed In The ITI Certification Manual For TAB Technicians	**a) Constant volume system controls**	**b) Variable volume system controls**	**c) Air-side economizers**	**d) Air distribution system leakage**	**e) Demand controlled ventilation with CO2 sensors**	**f) Demand controlled ventilation with occupancy sensors**	**g) Automatic demand shed controls**	**h) Hydronic valve leakage**	**i) Hydronic system variable flow controls**	**j) Supply air temperature reset controls**	**k) Condenser water temperature reset controls**	**l) Outdoor air ventilation systems**	**m) Supply fan variable flow controls**	**n) Boiler and chiller isolation controls**	**o) Fault detection and diagnostics for packaged direct-expansion units**	**p) Automatic fault detection and diagnostics for air handling units and zone terminal units**	**q) Distributed energy storage direct-expansion air conditioning systems**	**r) Thermal energy storage systems**	**s) Building Energy Efficiency Standards mechanical acceptance testing procedures**	**t) Building Energy Efficiency Standards acceptance testing compliance documentation for mechanical systems**
Mathematics	X	X		X	X	X				X	X	X	X							
Fluid Flow	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		
Heat Transfer	X	X					X	X	X	X	X	X		X	X	X	X	X		
Psychrometrics	X	X	X		X	X	X			X	X	X		X	X	X	X	X		
Project Documents	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Air Distribution Systems	X	X	X	X	X	X	X					X			X	X	X	X		
Hydronic Distribution Systems							X	X	X		X			X		X	X	X		
Automatic Control Systems	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Electrical Systems	X	X											X							
Instrumentation	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X		
Direct Digital Controls	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X		
Preliminary TAB Procedures	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Air System TAB Procedures	X	X	X	X	X	X	X					X			X	X	X	X		
Specific Air System Procedures	X	X	X	X	X	X	X			X		X	X		X	X	X	X		
Hydronic System TAB Procedures							X	X	X		X			X		X	X	X		
Considerations for TAB																				
Reference Data	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		

As shown in the table above, the standards of proficiency for TABB-certified technicians cover all training curricula for Mechanical Acceptance Test Technicians in analysis, theory, and practical application mandated by the Title 24 Building Energy Efficiency Standards.

Topics listed as points s) Building Energy Efficiency Standards mechanical acceptance testing procedures; and t) Building Energy Efficiency Standards acceptance testing compliance documentation for mechanical systems in the table on page 3 are addressed in Section 3.2.

3.2 Training for Acceptance Test Technicians

3.2.1 Classroom Training

Training for Mechanical Acceptance Test Technicians encompasses classroom training with hands-on demonstration in all mechanical acceptance tests as specified by Title 24 Part 6 Section 120.5 – Required Nonresidential Mechanical System Acceptance.

NEMIC provides two levels of MATT Certification. Both the Certification Exams and the Technician Training are developed from the Knowledge Bases as identified in the NEMIC ATTCP Certification Manual, Section 6 (Attachment 2.1) The training encompasses several modules:

- Module 1 Overview of the Mechanical Acceptance Testing Technician Training & Certification Process, Intro & Fundamentals
- Module 2-10 (MATT Level 1) Mechanical Acceptance Tests within MATT Level 1 Scope
- Module 2-19 (MATT Level 2) Mechanical Acceptance Tests within MATT Level 2 Scope

The training materials include Resource Manuals assembled for the current and next most-recent versions of the Standards.

A copy of the training modules as developed from the Knowledge Bases is in Attachment 3.2 (Submitted under CEC Docket Request for Confidentiality).

3.2.2 Hands-on Training

The SMART Locals 104, 105, and 206, which cover all of California, in conjunction with the California Association of Sheet Metal and Air Conditioning Contractors' National Association (CALSMACNA) jointly fund and operate the following Joint Apprenticeship Training Centers (JATC):

- Bakersfield
- City of Industry
- Fairfield
- Fresno
- Modesto
- Monterey
- Sacramento
- San Diego
- San Jose

- San Leandro
- Ventura

Each JATC features classrooms and laboratories, where apprentices and journeypersons (technicians) receive hands-on training. Attachment 3.3 (Submitted under CEC Docket Request for Confidentiality) documents a typical JATC with various HVAC equipment and systems and indicates on what specific pieces of equipment the respective mechanical acceptance tests will be trained upon.

3.3 Certification of Mechanical Acceptance Test Technicians

Certification of mechanical Acceptance Testing Technicians and their employers is documented in the NEMIC ATTCP Certification Manual, Attachment 2.1.

The Certification Manual details the eligibility requirements each candidate must meet prior to being allowed to take the ATTCP certification exam. These include, i.e., the applicant must:

- Be eligible as described in Section 3.3 of the Manual
- Hold an ITI certificate of completion of having received training on mechanical acceptance testing mandates and procedures as specified by the latest version of the California Building Energy Efficiency Standards
- Have passed the Certification Exam(s) as set forth in the Manual.

A copy of the Mechanical Test Technician Certification Exams is found in Attachment 3.4 (Submitted under CEC Docket Request for Confidentiality)

3.4 Instructor to Trainee Ratio

This section addresses CCR Title 24 Part 1 Section 10-103.2(c)3B(iv), i.e., the ATTCP shall document in its application to the Energy Commission why its instructor to trainee ratio is sufficient based on industry standards and other relevant information.

As indicated in Section 1 of the subject application, the training function is provided by International Training Institute for Acceptance Testing Technician candidates and by National Energy Management Institute for Acceptance Testing Employer candidates.

The training programs and materials offered by ITI are the result of an employee welfare benefit plan established on May 12, 1971 to fund the training and development of apprentices and workers in the sheet metal industry. ITI commits to:

- Provides and maintains training and retraining programs
- Conducts train-the-trainer programs

- Develops and distributes training materials designed to improve the quality of workmanship and productivity in the sheet metal industry, including training to meet the 2013 California Building Standards
- Investigates, researches and monitors changing technology and specialty fields to meet the ever-evolving demands of a dynamic industry

NEMI has been training contractor since 1981.

The instructor to ratio depends if the instructions are classroom only or if they include hands-on training in the laboratories / shop floor. Historically, both ITI and NEMI have maintained a 1-20 instructor-to-trainees ratio for classroom instructions. That ratio changes significantly when hands-on training is involved. In laboratory / shop floor hands-on instructions the instructor-to-trainees ratio is 1 to 6-12. As the training of the Mechanical Acceptance Testing Technician candidates includes hands-on instructions as well, the instructor-to-trainees ratio will be about 1-10.

3.5 Technician Coverage of the State of California

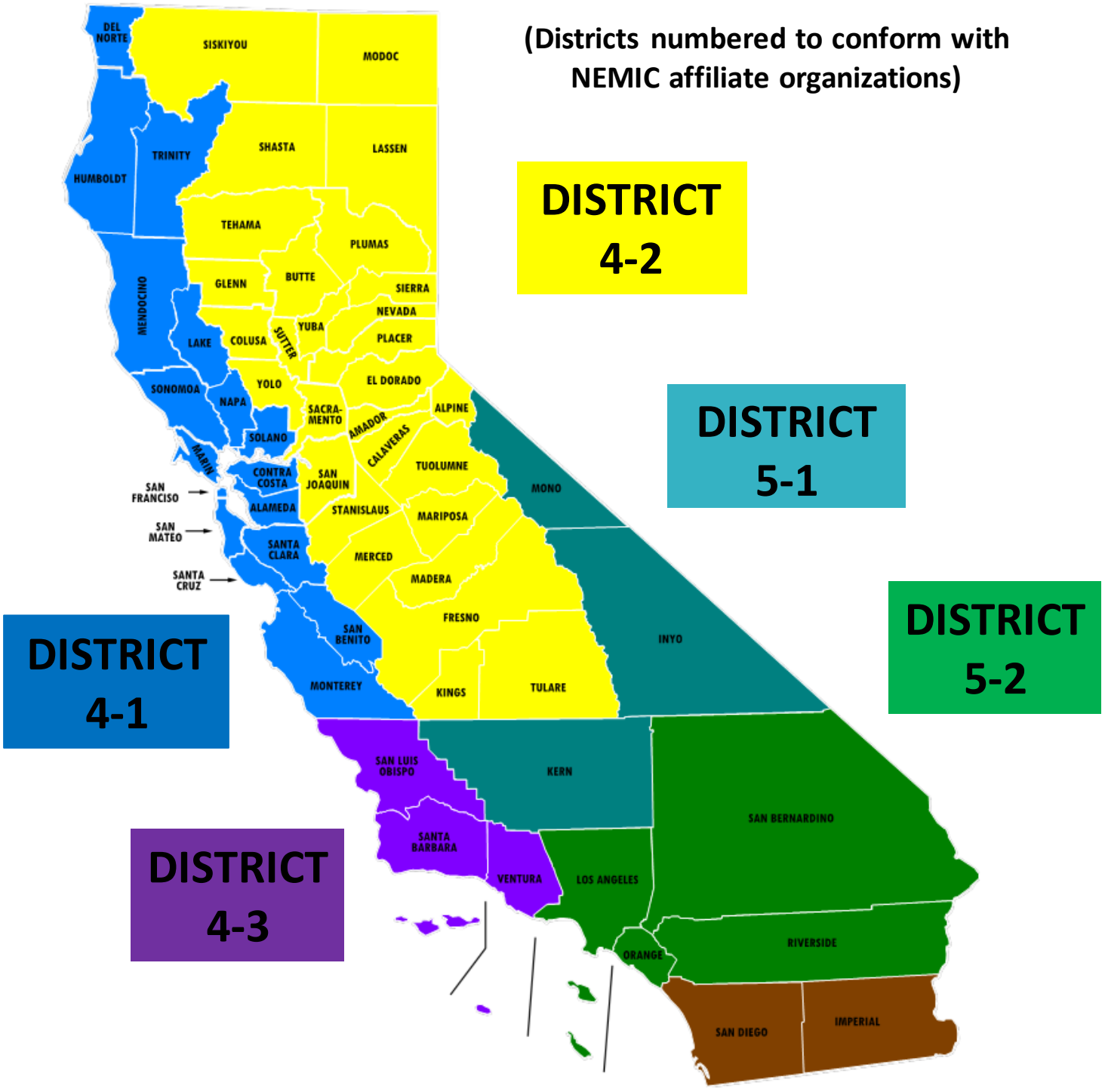
In previous years, all NEMIC-certified Acceptance Test Technicians (ATTs) have been what are now identified as Mechanical Acceptance Test Technician (MATT) Level 2. The map on the following page shows the regions of California covered by the NEMIC ATTCP. Existing and potential MATTs consist of the following categories:

- Existing NEMIC ATT-certified technicians in the state of California by county (now identified as MATT Level 2).
- SMART Apprentices in the state by training center regions (all to become at least MATT Level 1 with some becoming MATT Level 2)
- SMART Journeypersons in the state by region (potential MATT Level 1 for those who are not MATT Level 2)

As of early 2019, there are ~230 NEMIC-certified MATT Level 2s (previously identified as ATTs). In addition, there are approximately 2500 SMART HVAC apprentices in California who are eligible to become certified MATTs over the next three years and approximately 7000 SMART HVAC journeypersons in California who are eligible to become certified MATTs.

NEMIC ATTCP DISTRICTS

(Districts numbered to conform with NEMIC affiliate organizations)



3.6 Industry Coverage

This section addresses Title 24, Part 1, Section 10-103.2(b)2. *Industry Coverage by Certification Provider(s)*.

NEMIC's legal status as an industry trust fund dictates the all benefits must flow to its members. Members of NEMIC are signatory employers (contractors) who make contributions to NEMIC on behalf of its employees; here it would be TABB-certified technicians, and ultimately, certified mechanical Acceptance Testing Technicians.

To gain ANSI accreditation under ANSI/IEC/ISO 17024 NEMIC had to demonstrate that that any prequalified member of the HVAC industry, which includes but is not limited to HVAC installing and servicing contractors, mechanical contractors, TAB contractors, controls contractors, commissioning agents and professional engineers, are able to become signatory members of NEMIC. Given that NEMIC has and will continue to operate as an ANSI-accredited personal certification provider, industry coverage is assured as mandated by Title 24, Part 1, Section 10-103.2 (b)2.

4 Complaint Procedures

This section addresses CCR Title 24 Part 1 Section 10-103.2(c)3D, i.e., documents how the NEMIC will implement procedures for notifying building departments and the public that the NEMIC will accept complaints regarding the performance of any certified acceptance test technician or employer, and procedures for how the NEMIC will address these complaints.

This section was previously submitted the date 27 February 2015 and approved by the CEC on March 11, 2015.

The Complaint Procedure is fully documented in the Certification Manual, Section 2.6 *ATTCP Procedures for Resolution of Complaints* (see Attachment 2.1). The ATTCP website provides a guideline for how to submit a complaint regarding conduct or performance of a NEMIC-certified Mechanical Acceptance Testing Technician or their Employer.

5 Revocation Procedures

This section addresses CCR Title 24 Part 1 Section 10-103.2(c)3E, i.e., document how the NEMIC will implement procedures for revoking the certification of Acceptance Test Technicians and Employers 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 for the issuance of building permits or other specified actions that justify decertification.

This section was previously submitted with the date 27 February 2015 and approved by the CEC on March 11, 2015.

The Revocation Procedures are fully documented in the Certification Manual, Section 2.4 *Suspension or Withdrawal of Certification,* Section 3.5 *Decertification* (of Technicians) and Section 4.6 *Decertification* (of Employers) (see Attachment 2.1).

6 Quality Assurance Program

This section addresses CCR Title 24 Part 1 Section 10-103.2(c)3F, i.e., document how the NEMIC certification business practices include quality assurance, independent oversight and accountability measures such as third party oversight of the certification processes and procedures, visits to building sites where certified technicians are completing acceptance tests, certification process evaluations, building department surveys to determine acceptance testing effectiveness, and expert review of the training curricula developed for Title 24, Part 6 Building Energy Efficiency Standards, Section 120.5.

This Section was previously submitted as a stand-alone document with the NEMIC ATTCP 2016 Update Report and was approved by the CEC on June 13, 2018. The only Substantive Change to this Section with the 2019 Application Amendment is to Table 6.5, Results of Audit Failure, which was adjusted to conform with CEC-approved practices of other Mechanical ATTCPs.

Summary of NEMIC Method of Compliance

6.1 Scope

All NEMIC ATTCP-certified acceptance test employers (ATE) and acceptance test technicians (ATT) must participate in the NEMIC ATTCP QAP. To administer the NEMIC QAP, NEMIC has hired an independent third party, ICF Inc

6.2 Conformance to NEMIC ATTCP Code of Conduct

Each technician and employer certified by NEMIC under California Code of Regulations Title 24 Part 1, Sections 10-102 and 10-103.2 is expected to practice their profession consistent with the procedures applicable to the certification, and the highest quality work and to adhere to the NEMIC ATTCP *Code of Conduct* at all times (see NEMIC ATTCP Certification Manual, Section 4.7 *Employer Certification Obligations and Code of Conduct*).

All NEMIC ATTCP-certified ATTs must maintain their NEMIC ATT certifications at all times. Additionally, NEMIC MATT Level 2 Certificants must maintain their ICB TABB Technician certification at all times. Failure to maintain the MATT Level 1 certification shall result in immediate loss of the NEMIC MATT Level 1 Certification. Failure to maintain both the NEMIC MATT Level 2 and ICB TABB Technician certification shall result in immediate loss of the NEMIC ATTCP MATT Level 2 certification. The ATT must adhere to the *Technician Certification Obligations and Code of Conduct* as describe in this Manual, Section 3.8, at all times.

NEMIC ATTCP-certified ATEs must maintain a system of quality controls governing their operations. These are the procedures a company puts in place that help the company ensure the delivery of quality services to the customer. These procedures include clearly established protocols and best practices for the work that is being done. NEMIC ATTCP certified ATEs must adhere to the following policies and procedures.

6.3 Employ NEMIC-Certified Acceptance Test Technicians

NEMIC ATTCP-certified ATEs agree to employ NEMIC-certified ATTs in quantity and designation for the scope of the business operation at each location sufficient to conduct testing to the Standards and to sign off on certificates of completion. NEMIC ATTCP-certified ATEs agree to use only NEMIC -certified ATTs for acceptance testing.

6.4 Equipment

NEMIC-certified ATTs must ensure that they have the necessary serviceable, calibrated tools, equipment and instruments available for conducting mechanical acceptance testing work. NEMIC -certified ATTs are required to provide diagnostic equipment and instrument calibration records upon request. NEMIC does not mandate the purchase or ownership of any specific piece or brand or tool, equipment or instrument for purposes of certification. NEMIC may request and review an organization's tool and equipment inventory to determine whether the organization has the capability to be certified for mechanical acceptance testing as mandated by the Standards based on the tools, equipment, and instruments in the inventory.

6.5 Disclosure of Information

To verify the scope of the organization's work, upon request, NEMIC ATTCP -certified ATEs will provide NEMIC with access to certain records or data that sub6.6stantiate ATT findings.

Based on the program parameters, a percentage of projects, chosen randomly, will receive either a paperwork "desk" review, or an onsite, in-person, quality-assurance review. Each review will be based upon the following fee structure.

Table 6.1 ICF Audit Fee Structure

Type of Review/Audit	Fee Paid to ICF
For Each Quality Assurance Desk Review	**$300**
Per On-Site, In Person Quality Assurance Visit	**$950**

6.6 General Appeals

Any and all objections with regard to the NEMIC QAP will be resolved according to the procedures set forth in the Manual Section 2.5 *Certification-Related Appeal Procedures*. All appeals will be categorized as General Appeals.

6.7 Audit Sampling Background

NEMIC and ICF have designed a quality assurance "audit" program utilizing best practices around a "quality assurance audit model." NEMIC follow the guidelines established by the American Institute of CPA's (AICPA) in the "*Audit Sampling Considerations of Circular A-133 Compliance Audits*" to address sampling size in an audit environment.

A-133 audits are required by the federal government and provide a statistically reliable method of quality assurance. In the "Audit Sample"" chapter AICPA recommends, "*If the auditor determines that internal control over compliance is effectively designed and implemented, Circular A-133 requires that the auditor plan the audit to support a low level of assessed control risk. This requires the auditor to plan to obtain a high level of assurance that controls operate as designed. Therefore, generally, samples for control tests are designed to achieve a 90 percent to 95 percent confidence level.*"

However, AICPA state that there are several inherent risk factors that could impact noncompliance, which included, specifically:

New program with little history with compliance requirement;

Complex processing or judgment;

Significant deficiencies or material weaknesses observed in the past;

Correspondence from program officials indicating potential problems;

Lack of adherence to applicable laws and regulations in prior years;

High auditee turnover in a particular area;

Very high volume of activity; and/or

Substantial change in the policies, processes, or personnel associated with the compliance requirement.

For new programs, it is recommended the audit program require a 98 percent confidence level at first to ensure that any initial issues with noncompliance are identified and addressed. Because the NEMIC QAP is a new program that will initially consist entirely of newly certified mechanical ATTs, ICF has set a goal of conducting enough quality assurance audits during the first three years of the program to have a 98% confidence level that all acceptance test assessments are done correctly. As the program becomes more established and the NEMIC ATTCP-certified ATT workforce becomes more experienced, these quality assurance visits will decrease to a 95% confidence level in years 3-5 and then a 90% confidence level when the program is established in year 5 and beyond. The confidence levels for the program are described in the table below.

Table 6.2. Confidence Levels of the NEMIC QAP

Time Period	Confidence Level
2016/2019 Code	**98%**
2022 Code and Beyond	**95%**

The formula for determining the appropriate confidence level is:

$$p \pm z * \sqrt{\frac{p(1-p)}{n}}$$

Where

p = percentage estimator
z = z-Score or standard score which is the number of standard deviations above the mean
n = sample size

As requested by the California Energy Commission (CEC) staff, NEMIC, in its role as a mechanical ATTCP, will conduct two types of audits. A paper quality assurance audit and an on-site quality assurance audit. Table 3 shows the type and frequency of audits to be conducted under the NEMIC QAP.

Table 6.3. Type and Frequency of Audits to Be Conducted Under the NEMIC QAP

Time Period	Confidence Level	% of Projects Audited*	Paper Audits	On-Site Audits
2016/2019 Code Cycle	**98%**	**4%**	**3%**	**1%**
2022 Code Cycle and Beyond	**95%**	**2%**	**1%**	**1%**

*the actual number of projects audited will depend on the total number of projects, the above identified is the anticipating a minimum pool of 8,000 projects in the course of a year. If more projects are completed the % of projects audited will decrease. 8,000 was the number of CALCTP audits conducted in 2017.

ICF will use the following formula to determine the appropriate sample size:

$$n = \left[\frac{z\ \sigma}{E}\right]^2$$

Where

n = sample size
z = z-Score which is determined by the confidence level
Φ =1-standard deviation
E = Estimate of error

NEMIC's third party QAP provider, ICF, will contact the ATT and the ATE regarding a site audit. For on-site audits, ICF will conduct the audit simultaneously as the ATT is conducting the site's acceptance test.

6.8 Failed Item versus a Failed Test

A "failed Item" constitutes a category of failure on the part of the mechanical ATT, such as:

Failure to ensure appropriate documentation is available and complete;

Failure to conduct all or elements of a construction inspection, failure to verify equipment information is posted, and

Failure to verify installed mechanical controls are certified to the California Energy Commission.

A "failed test" occurs when at least one of the threshold specifications is not met during the testing and inspection process. "Threshold Specifications" is a set of specific pass/fail criteria for each mechanical control device or system requiring acceptance testing. A description of failed items and test failures per mechanical acceptance test forms are listed in Section 6.11 and 6.12.

6.9 Auditor Qualifications

All audits, written and onsite, will be performed by NEMIC-certified Acceptance Test Technicians.

6.10 Random Audit Sampling Process

The information below sets forth the random audit sampling process and identifies the items that can result in a failed audit.

As requested by the California Energy Commission (CEC) staff, NEMIC as a mechanical ATTCP will conduct two types of audits. A paper quality assurance audit and an on-site quality assurance audit. The breakdown of audits of the NEMIC ATTCP-certified ATTs will be as shown in Table 4.

Table 6.4. Breakdown of Frequency and Type of Audits by Code Cycle

Time Period	Confidence Level	% of Projects Audited*	Paper Audits	On-Site Audits
2016/2019 Code Cycle	**98%**	**4%**	**3%**	**1%**
2022 Code Cycle and Beyond	**95%**	**2%**	**1%**	**1%**

* The actual number of projects audited will depend on the total number of projects, the above identified is the anticipating a minimum pool of 8,000 projects in the course of a year. If more projects are completed the % of projects audited will decrease.

If an ATT has failed either a paper quality assurance audit or an on-site-quality audit the NEMIC ATTCP-certified ATT will receive additional quality assurance oversight. As opposed to the anticipated percentage referenced above, ATTs who fail a quality assurance site visit will receive scrutiny as listed in Table 6.5.

Table 6.5. Results of Audit Failure

Result	Action That Will Be Take
Minor infraction	Warning issued (ATE and ATT)
Failed either a paper or on-site quality assurance audit	Targeted retraining and re-examination (ATE or ATT)
Failed a second paper or on-site quality assurance audit	Decertification (ATE or ATT) with the option to restore certification with the successful completion of the full training and examination requirements.

The NEMIC ATTCP will incorporate mandatory reporting of projects by its certified Acceptance Test Employers. The reporting process will be as follows:

1) Winning bid information will be provided to ICF
2) ICF will receive a weekly list of projects (both upcoming through winning bid and recently completed, as well as a schedule of when actual project work will be done.
3) ICF will use the information to identify projects for both paper and on-site auditing

Failure by the ATEs to comply with these mandatory requirements will result in decertification.

The NEMIC ATTCP will randomly select projects without tipping off the ATEs as follows:

1) Using the project schedule information, ICF will randomly select a project for an onsite audit. The onsite audit will be performed at the same time the Acceptance Test Technician performs the acceptance testing.
2) Regardless of if a scheduled acceptance test is selected for audit, ICF will systematically contact the ATE (either by voice, email, or phone-app) to confirm the scheduled acceptance test (date and estimated time) for each winning bid no more than 3 days in advance of the scheduled date.
3) The ATE will be notified of an on-site audit in-person by the quality assurance inspector at the time and date of the scheduled acceptance test.
4) Failure by the ATE to provide ICF with a notice of changes to the project schedule will be reported as a failed audit. For example, should the auditor arrive at the project site at the scheduled date and time and the ATT is not present constitutes a failed audit. A second failure will result in a written reprimand, a third failure will result in decertification of the ATE.

The NEMIC ATTCP reporting process of the onsite audits will be as follows:

1) ICF will send a completed electronic copy of the audit results to the ATE/ATT and the NEMIC ATTCP
2) ICF will track the results of all audits in a database and share with the NEMIC ATTCP for its annual report to the California Energy Commission.
3) ICF will keep electronic copies of the audit findings and reports for a period of 5 years.

4) NEMIC maintains a database of all accounts, both ATT and ATE's, including any pertinent documentation. Here, ATE's account will contain copies of the completed projects. The ATT's account will contain copies of the completed mechanical acceptance tests, i.e., NRCA-MEC-X forms. Copies of the database are held ad infinitum.

6.11 Individual Acceptance Test Onsite Audit Pass/Fail Criteria

The on-site audit pass/fail criteria are derived from the Appendix NA7.5 *Mechanical Systems Acceptance Tests* within the *Reference Appendices for the Building Energy Efficiency Standard* under which the project was permitted.

NA7.5.1 Outdoor Air (Document NRCA-MCH-02-A)

Construction Inspection Failure

1. The ATT failed to indicate method and equipment used to measure airflow during the functional test.
2. The ATT failed to attach the calibration certificate or field calibration results to the acceptance test document.
3. The ATT failed to review the operation sequences to ensure the system performs dynamic control of minimum outdoor air and reviews the installation to confirm all of the devices of that sequence are present.
4. The ATT failed to indicate the dynamic control method used to control OSA in the system and/or failed to indicate the method used to deliver outside air to the unit.
5. The ATT failed to conduct a preoccupancy purge for the 1-hour period immediately before normal occupancy of the building per §120.1(c)2.

Functional Test Failure

The ATT failed to follow one or more of the steps.

Step 1. Disable demand control ventilation, if applicable.

Step 2. Verify unit is not in economizer mode. Disable the air economizer, if applicable. The ATT needs to measure and document the outdoor air flow in one of the accepted ways. The outdoor airflow rate needs to be confirmed within 10 percent of what is found on mechanical plan check document NRCC-MCH-03-E Column M, or mechanical equipment schedules.

Step 3. Modify VAV boxes to achieve full design airflow. The ATT needs to

- Document the supply airflow at full cooling on the acceptance document.
- Document VFD speed; VFDs should be at or near 60Hz.
- Document the measured outdoor air reading. Document the required outdoor airflow as found on mechanical plan check document NRCC-MCH-03-E Column M, or mechanical equipment schedules. In the "Testing Calculation and Results" section of the acceptance document, confirm that measured outdoor air flow is within 10 percent of design outdoor air flow rate.

- Document time for OSA damper to stabilize after the VAV boxes open on the acceptance document. Confirm that dampers stabilize within 5 minutes.

Step 4. Drive all VAV boxes to either the minimum airflow, full heating airflow, or 30 percent of total design airflow. The ATT needs to:

- Document the supply airflow on the acceptance document.
- Document VFD speed.
- Document the measured outdoor air reading. In the "Testing Calculation and Results" section of the acceptance document, confirm that measured outdoor air flow is within 10 percent of design outdoor air flow rate found on mechanical plan check document NRCC-MCH-03-E Column M, or mechanical equipment schedules.
- Document time for OSA damper to stabilize after the VAV boxes open on the acceptance document. Confirm that dampers stabilize within 5 minutes. The intent is to ensure the PID control loops are tuned properly.

NA7.5.2 Constant Volume, Single-Zone, Unitary Air Conditioner and Heat Pumps Systems Acceptance (Document NRCA-MCH-03-A)

Construction Inspection Failure:

1. The ATT fails to verify the thermostat, or temperature sensor, is within the zone that the respective HVAC system serves.
2. The ATT fails to verify the thermostat is wired to the HVAC unit correctly. In particular, ensure that multiple stage terminals (that is, first and second stage wires) on the thermostat, both cooling and heating stages, are wired to the corresponding circuits at the HVAC unit.
3. The ATT fails to verify no factory-installed or field-installed jumpers exist across the first and second stage cooling terminals at the unit.
4. The ATT fails to verify on heat pumps the "O" terminal on the thermostat is wired to the reversing valve at the unit. The ATT also fails to verify the thermostat dip switch or programmable software is set to heat pump.
5. The ATT fails to verify the thermostat meets the temperature adjustment and dead band requirements of §120.2(b): The thermostat shall allow a heating set-point of 55°F or lower and a cooling set-point of 85°F or higher. The dead band shall be at least 5°F, where heating and cooling is shut off. On the acceptance document MECH-04A, note the minimum heating set-point, maximum cooling set-point, and dead band.
6. The ATT fails to verify occupied, unoccupied, and holiday schedules have been programmed per the schedule of the facility.
7. The ATT fails to verify the preoccupancy purge has been programmed to meet the requirements of §120.1(c)2.

Functional Test Failure

The ATT failed to follow one or more of the steps.

Step 1. Disable economizer control and demand-controlled ventilation systems to prevent unexpected interactions.

Step 2. Simulate a heating demand during occupied condition and verify:

- Supply fan operates continually during occupied condition.
- Ensure all available heating stages operate; the heater stages on.
- No cooling is provided by the unit and outdoor air damper is open to minimum ventilation position

Step 3. Simulate operation in the dead band (no-load condition) during occupied condition. Verify and document that

- Supply fan operates continually during occupied condition;
- Heating and cooling is not provided by the unit; and
- Outdoor air damper is open to minimum ventilation position.

Step 4. Simulate a cooling demand during occupied condition. Verify and document that

- Supply fan operates continually during occupied condition;
- All available cooling stages operate; the compressor stages on;
- No heating is provided by the unit; and
- Outdoor air damper is open to minimum ventilation position.

Step 5. Simulate operation in the dead band (no-load condition) during unoccupied condition. Verify and document that

- Supply fan shuts off during unoccupied condition;
- Unit does not provide heating or cooling; and
- Outdoor air damper is fully closed.

Step 6. Simulate heating demand during unoccupied condition. Verify and document that

- Supply fan cycles on with call for heating;
- Heating is provided by the unit; heater stages on;
- No cooling is provided by the unit; and
- Outdoor air damper is either fully closed or at minimum position

Step 7. Simulate cooling demand during unoccupied condition. Verify and document that

- Supply fan cycles on with call for cooling;
- No heating is provided by the unit;
- Cooling is provided by the unit; and
- Outdoor air damper is either fully closed or at minimum position.

Step 8. Simulate manual override during unoccupied condition. The ATT needs to:

- Verify and document that the system reverts back to an "occupied" condition. For a DDC control system, verify the "active" heating and cooling set-points correspond to those programmed for the occupied condition. For a programmable thermostat, the thermostat may display that it is in the "occupied" mode;
- Verify and document that that the system reverts back to an "unoccupied" condition when manual override period expires. It may be necessary to adjust the length of the override period to minimize test time;
- Check that the supply fan operates continually during occupied condition; and
- Check that outside air damper is open to minimum ventilation position.

NA7.5.3 Air Distribution Systems Acceptance (Document NRCA-MCH-04-A)

Construction Inspection Failure

The ATT fails to review the drawings and construction to verify that the following items are specified in the construction set and installed in the field.

- Draw-bands are either stainless steel worm-drive hose clamps or UV-resistant nylon duct ties. Verify compliance by reviewing material cut sheets and visual inspection;
- Flexible ducts are not constricted in any way;
- Joints and seams are not sealed with a cloth-backed rubber adhesive tape unless used in combination with mastic and draw-bands;
- Duct insulation R-value shall comply with §120.4(a), §120.4(c), and §120.4(d) and can be verified by reviewing material cut sheets and through visual inspection; and
- Insulation is protected from damage or is suitable for outdoor usage, per §120.4(f). Compliance is verified by reviewing material cut sheets and through visual inspection.

Functional Test Failure

The ATT failed to follow the steps below or it is a failed test.

For **new duct systems**, the ATT blocks all of the supply and return registers or diffusers. Then, the ATT pressurizes the ducts with a fan flowmeter to a positive 25 Pa (0.10 inches of water) and record the leakage airflow measured by the fan flowmeter. This measured leakage is divided by the total fan flow to generate the leakage percentage value. When this leakage percentage is less than or equal to 6 percent, the system passes.

For **existing duct systems** needing additional ducts added, undergoing major repairs, or having equipment replaced that connects to the ducts, the leakage rate of the existing duct system shall be tested first before proceeding with any alterations. This leakage amount is the pretest leakage value. Next, proceed with the test method described above for new duct systems to measure the final test leakage rate, with the only exception that the maximum leakage allowed is increased to 15 percent.

After completing the air distribution system acceptance test, the ATT shall affix a sticker to the air handler access door describing whether the system met the prescriptive leakage requirements (6 percent leakage for new systems and 15 percent for existing systems) or if the system failed to meet this standard but all accessible leaks were sealed.

NA7.5.4 Air Economizer Controls Acceptance (Document NRCA-MCH-05-A)

Construction Inspection Failure

1. The ATT failed to check that the air economizer outside (lockout) sensor location is adequate to achieve the desired control and prevent false readings.
2. The ATT failed to check the economizer reliability features are present per §140.4(e)4. This includes the following:
   - Verify the economizer has a 5-year warranty of the assembly.
   - Provide a product specification sheet proving economizer assembly capability of at least 60,000 actuations.
   - Provide a product specification sheet proving economizer damper sections are certified by AMCA 511 for a maximum damper leakage rate of 10 cfm/sf at 1.0 in. w.g. (Class 1A, 1, and 2 are acceptable.)
   - If the high limit set-point is fixed dry-bulb or fixed enthalpy + fixed dry-bulb, then the control shall have an adjustable set-point.
   - Outdoor air, return air, mixed air, and supply air sensors shall be calibrated as follows:
     - ✓ Dry-bulb and wet-bulb temperatures accurate to ±2°F over the range of 40°F to 80°F.
     - ✓ Enthalpy accurate to ±3 Btu/lb. over the range of 20 Btu/lb. to 36 Btu/lb.
     - ✓ Relative humidity (RH) accurate to ±5 percent over the range of 20 percent to 80 percent RH.
   - Check that the sensor performance curve(s) is provided by the factory with economizer instruction materials, and that sensor output values measured during sensor calibration are plotted on the performance curve(s).
   - Sensors used for high limit control shall be located to prevent false readings, including, but not limited to, being properly shielded from direct sunlight.
   - For unitary systems 65,000 Btu/hr or less, verify that a two-stage thermostat is used, and that the system is wired so that the economizer is the first stage of cooling and the compressor is the second stage.
   - The ATT failed to check that all systems have some method of relief to prevent over pressurization of the building when in full economizing mode (100 percent outdoor air).
   - For systems with DDC controls, the ATT failed to check that lockout sensor(s) are either factory calibrated or field calibrated. For systems with non-DDC controls, the ATT failed to check that manufacturer's startup and testing procedures have been applied.

Functional Test Failure

The ATT failed to follow one or more of the steps.

Steps for Stand-Alone Package – Trane Voyager and Precedent Series

Step 1. Disable demand control ventilation (DCV) system mode.

Step 2. Use internal test sequences to enable operating modes.

- 1st jumper – supply fan is enabled
- 2nd jumper – economizer mode is enabled
- 3rd jumper – compressor is enabled
- 4th jumper – heating stage is enabled

Verify and document that

- The outdoor air damper opens completely and the return damper closes completely during economizer mode;
- The outside air damper remains 100 percent open while using mechanical cooling when the demand cannot be met by outside air alone and the system is still below the lockout point;
- Outdoor air damper is at minimum position when the supply fan is enabled;
- Outdoor air damper is at minimum position when the compressor is enabled and economizing is disabled;
- Outdoor air damper is at minimum position when heating is enabled and economizing is enabled; and
- The mixed/discharge cut-out sensor wire is landed on the SA terminal on the OEM board. If the sensor wire is not landed on the SA terminal, the economizer will not operate.

Step 3. Turn off the unit and verify that

- Economizer dampers close completely.
- Return air damper opens.

Step 4. Return system to normal operation.

After restoring power, the unit returns to normal operation, verifying the final economizer changeover dip-switch settings comply with Energy Standards Table 140.4-B per §140.4(e)3.

Honeywell Controllers

Step 1. Disable demand-controlled ventilation (DCV) system modes

Step 2. Simulate a cooling load and enable the economizer. Verify and document that

- Outdoor air dampers open fully. Adjust linkages, if necessary, to ensure dampers are at the desired position;

- Return air dampers close completely. Adjust linkages, if necessary, to ensure dampers are at the desired position; and
- Compressor runs when cooling load becomes too high for economizing to meet alone. The outdoor air dampers should remain 100 percent open at this point.

Step 3. Simulate a cooling load and disable the economizer. Verify and document that

- Outdoor air dampers close to minimum position. Adjust linkages, if necessary, to ensure dampers are at the desired position;
- Return air dampers open completely. Adjust linkages, if necessary, to ensure dampers are at the desired position; and
- The compressor operates.

Step 4. If the unit is equipped with heating, simulate a heating load with the economizer enabled. Verify and document that

- Outdoor air dampers remain at minimum position;
- Heating is enabled; and
- The compressor does not operate.

Step 5. Turn off unit. Verify and document that

- Economizer dampers close completely.
- Return air damper opens.

Step 6. Return system back to normal operating condition. Verify and document that the final economizer changeover setting (A, B, C, D) complies with Energy Standards Table 140.4-B per §140.4(e)3.

Carrier Durablade

Step 1. Disable demand-controlled ventilation (DCV) system modes, if applicable to the unit.

Step 2. Simulate a cooling load and enable the economizer. Verify and document that

- Damper blade slides completely across the return air duct, and mixed air plenum is open to the outdoor air intake. Adjust end switches as necessary to achieve the desired position; and
- The compressor does not run.

Step 3. Simulate a cooling load and disable the economizer. Verify and document that

- Damper blade returns to minimum outdoor air position. Adjust end switches as necessary to achieve the desired position; and
- The compressor operates

Step 4. If the unit is equipped with heating, simulate a heating load with the economizer disabled. Verify and document that

- Economizer dampers close completely; and
- Return air damper opens.

Step 5. Turn off unit. Verify and document that

- Economizer dampers close completely.
- Heating and cooling do not operate.

Step 6. Return system back to normal operating condition, Verify and document that final economizer changeover setting complies with Energy Standards Table 140.4-B per §140.4(e)3

DDC Controls

Step 1. Disable demand controlled ventilation (DCV) system modes.

Step 2. Simulate a cooling load and enable the economizer. Verify and document that

- Outdoor air damper modulates open to a maximum position;
- Return air damper modulates closed and is 100 percent closed when the outdoor air dampers are 100 percent open; and
- Outdoor air damper is 100 percent open before mechanical cooling is enabled.

Step 3. Simulate a cooling load and disable the economizer. Verify and document that

- Outdoor air damper closes to a minimum position;
- Return air damper opens to normal operating position when the system is not in economizer mode; and
- Mechanical cooling remains enabled to satisfy discharge air temperature set-point.

Step 4. If the system has heating, simulate a heating demand and enable the economizer. Verify and document that

- Outdoor air dampers remain at a minimum position;
- Return air dampers remain open;
- Heating is enabled to satisfy discharge air temperature set-point; and
- Mechanical cooling is disabled.

Step 5. Turn off all systems. Verify and document that

- Outdoor air dampers close completely; and
- Heating and cooling do not operate.

Step 6. Return system back to normal operating condition.

NA7.5.5 Demand Control Ventilation (DCV) Systems Acceptance (Document NRCA-MCH-06-A)

Construction Inspection Failure

The CO_2 sensor is either factory calibrated or field calibrated. A calibration certificate from the manufacturer will satisfy this requirement. If not, a field calibration is to be conducted. An ATT fails if neither of these inspections are performed.

Functional Test Failure

The ATT failed to follow one or more of the steps.

Step 1. Disable the economizer.
Step 2. Simulate a high space occupancy and verify the outdoor air damper modulates open.
Step 3. Simulate a low occupant density and verify the outdoor air damper modulates towards minimum position.

NA7.5.6 Supply Fan Variable Flow Controls Acceptance (Document NRCA-MCH-07-A)

Construction Inspection Failure

1. The ATT fails to check that the static pressure sensor location, set-point, and reset control meet the requirements of §140.4(c)2.
2. The ATT fails to verify the supply fan includes a means to modulate airflow such as a variable speed drive.
3. The ATT fails to perform a static pressure sensor(s) field calibration. When the value measured by the BAS is within 10 percent of the field-measured value, the sensor is calibrated. In addition, the ATT fails to attach supporting documentation to the NRCA-MCH-07-A document.

Functional Test Failure

The ATT failed to follow one or more of the steps.

Step 1. Drive all VAV boxes to achieve full design airflow. The ATT needs to

- Verify and document the system full design airflow in cfm (e.g. from design documents);
- Check that supply fan speed modulates to increase capacity. For VFD, record fan motor frequency (Hz);
- For multi-zone systems, check that supply fan maintains discharge static pressure set-point within ±10 percent of the current operating set point.

Verification can be accomplished by simply reading the value measured by calibrated pressure sensor and comparing it to set-point;
- When tests depart from NA7.5.1 (document NRCA-MCH-02-A), check if another method was used for verifying VFD operation (besides commanding to maximum flow and cooling); and
- Verify system operation and supply fan control stabilizes within 5 minutes.

Step 2. Drive all VAV boxes to a low airflow condition. Verify and document that

- Supply fan speed decreases to meet flow conditions. For VFD, record fan VFD frequency (Hz);
- For systems with DDC to the zone level, check that current operating static pressure set-point has decreased;
- For multi-zone systems, check that supply fan maintains discharge static pressure set-point within ± 10 percent of the current operating set point. Verification can be accomplished by simply reading the value measured by calibrated pressure sensor and comparing it to set-point; and
- System operation and supply fan control stabilizes within 5 minutes.

Step 3. Return system back to normal operating condition.

NA7.5.7 Valve Leakage Acceptance (Document NRCA-MCH-08-A)

Construction Inspection Failure

1. The ATT fails to collect the pump curve data and note the impeller size.
2. The ATT fails to ensure installation of all valve and piping arrangements per the design drawings.
3. The ATT fails to confirm measuring devices are located adequately to achieve the most accurate results measurements.
4. The ATT fails to confirm piping arrangements are correct located.

Functional Test Failure

The ATT failed to follow one or more of the steps.

Step 1. Dead head One Pump. Verify and Document:

Isolate one circulation pump and ensure all chillers (or boilers) are off. Close the isolation valve at the pumps discharge. Turn the pump on for no more than 5 minutes. Measure and note the pressure across the pump at this “dead head” condition. When the system is piped primary/secondary make sure there is a secondary pump. At the end of the measurement, turn off the pump and re-open the discharge valve.

Step 2. Step 2: Close control valves. Verify and Document

Ensure each control valve closes completely under normal operating pressure. The intent is to confirm the actuator-valve torque requirements are adequate to shut the

valve under normal operating system pressure. Verify complete closure by measuring the pressure across the operating pump. If the pressure is more than 5 percent less than the previous test, then one or more valves have not fully closed. Fix any leaks and retest.

NA7.5.8 Supply Water Temperature Reset Controls Acceptance (Document NRCA-MCH-09-A)

Construction Inspection Failure

1. The ATT failed to verify if the temperature sensors were either factory calibrated or field calibrated by a controls contractor, or other appropriate person.
2. If field calibrated, the ATT failed to provide supporting calibration documentation and attach to the NRCA-MECH-09-A document.

Functional Test Failure

The ATT failed to follow the steps below or it is a failed test.

Step 1. Change reset control variable to its maximum value. Verify and document that

- Chilled and/or heating hot water supply temperature set-point is reset to the appropriate value determined by the designer per the control strategy.
- Actual supply water temperature changes to within 2 percent of the control set-point.

Step 2. Change reset variable to its minimum value. Verify and document that

- Chilled and/or heating hot water supply temperature set-point is reset to the appropriate value determined by the designer per the control strategy; and
- Actual supply water temperature changes to within 2 percent of the control set-point.

Step 3. Test automatic control of reset control variable to automatic control. Verify and document that

- Chilled and/or heating hot water supply set-point is reset to the appropriate value;
- Actual supply temperature changes to meet the set-point; and
- The supply temperature is within 2 percent of the control set-point.

NA7.5.9 Hydronic System Variable Flow Control Acceptance (Document NRCA-MCH-10-A)

Construction Inspection Failure

1. The ATT fails to verify the static pressure location, set-point, and reset control must meet the requirements of the §140.4(k)6B.

2. The differential pressure sensor (when applicable) is factory or field calibrated by a controls contractor or other qualified person. Field calibration requires measuring system pressure (or differential pressure), as close to the existing sensor as possible using a calibrated hand-held measuring device. All pressure sensors must be within 10 percent of the calibrated reference sensor.
3. The ATT fails to provide supporting documentation must be attached to the Acceptance Document NRCA-MCH-10-A.

Functional Test Failure

The ATT failed to follow one or more of the steps.

Step 1. Modulate control valves to reduce water flow to 50 percent of the design flow or less, but not lower than the pump minimum flow. Verify and document that

- Current pump operating speed decreased (for systems with DDC to the zone level);
- Current operating set-point has not increased (for all other systems that are not DDC);
- System pressure is within 5 percent of current operating set-point. Record the measured system pressure at the control sensor. Record the system pressure set-point; and
- System operation stabilizes within 5 minutes after test procedures are initiated.

Step 2. Open control valves to increase water flow to a minimum of 90 percent design flow. Verify and document that

- Pump speed increases to 100 percent.
- System pressure increases and is within 5 percent of current operating set-point, record the measured system pressure at the control sensor. Record the system pressure set-point.
- System pressure set-point is greater than the set-point recorded in step 1.
- System operation stabilizes within 5 minutes after test starts.

Step 3. Restore system to initial operating conditions.

NA7.5.10 Automatic Demand Shed Control Acceptance (Document NRCA-MCH-11-A)

Construction Inspection Failure

The ATT failed to inspect that the EMCS interface was able to activate the central demand shed controls.

Functional Test Failure

The ATT failed to follow one or more of the steps.

Step 1. Engage the global demand shed system. Verify and document that

- The cooling set-points in the non-critical spaces increase by the expected amount.
- The cooling set-points in the critical spaces do not change.

Step 2. Disengage the global demand shed system. Verify and document that

- The cooling set-points in the non-critical spaces return to their original set-point.
- The cooling set-points in the critical spaces do not change.

NA7.5.11 Fault Detection and Diagnostics (FDD) for Packaged Direct-Expansion (DX) Units Acceptance (Document NRCA-MCH-12-A)

Construction Inspection Failure

The ATT failed to verify the installed FDD has been certified to the California Energy Commission and is listed on the California Energy Commission's website.

Functional Test Failure

The ATT failed to follow one or more of the steps. For each HVAC unit to be tested:

Test for Air Temperature Sensor Failure/Fault

Step 1. Verify the FDD system indicates normal operation.
Step 2. Disconnect outside air temperature sensor from unit controller. Verify and document that the FDD system reports a fault.
Step 3. Connect outside air temperature sensor to unit controller. Verify and document that the FDD system indicates normal operation.

Test for Excessive Outside Air

After passing the tests described in NA7.5.1 Outdoor Air, verify FDD system indicates normal operation.

Test for Economizer Operation

Step 1. Interfere with normal unit operation to generate an Air Economizer Control failure by immobilizing the outdoor air economizer damper according to manufacturer's instructions. After Air Economizer Controls fails, verify FDD system reports a fault.
Step 2. Successfully complete and pass tests described in NA7.5.4 Air Economizer Controls. Verify that the FDD system reports normal operation.

NA7.5.12 FDD for Air Handling Units and Zone Terminal Units Acceptance (Document NRCA-MCH-13-A)

Construction Inspection Failure

The ATT fails to test a minimum of 5 percent of the terminal boxes (VAV box) to any FDD system installed on an air handling unit or a zone terminal unit.

Functional Test Failure

Testing of each Air Handling Units with FDD controls

The ATT failed to follow the steps below or it is a failed test.

1 Sensor Drift/Failure

The threshold for a sensor drift fault should be given in percentage of full range, or in units for each type of sensor (temperature, differential pressure / airflow rate, etc.).

Step 1. Disconnect outside air temperature sensor from unit controller.
Step 2. Verify the FDD system reports a fault.
Step 3. Connect OATT sensor to the unit controller.
Step 4. Verify that FDD indicates normal system operation.

2 Damper/actuator fault

Step 1. From the control system workstation, command the mixing box dampers to full open (100 percent outdoor air), by lowering the supply air temperature set-point.
Step 2. Disconnect power to the actuator and verify that a fault is reported at the control workstation.
Step 3. Reconnect power to the actuator and command the mixing box dampers to full open by maintaining the supply air temperature set-point.
Step 4. Verify that the control system does not report a fault.
Step 5. From the control system workstation, command the mixing box dampers to a minimum position (0 percent outdoor air) by raising the supply air temperature set-point.
Step 6. Disconnect power to the actuator and verify that a fault is reported at the control workstation.
Step 7. Reconnect power to the actuator and command the dampers closed.
Step 8. Verify that the control system does not report a fault during normal operation.

3 Valve/actuator fault

Step 1. From the control system workstation, command the heating coil valve to the full open position by temporarily setting the space heating set-point

higher than the current space temperature, if the system is not in heating mode.

Step 2. Disconnect power to the actuator and verify that a fault is reported.

Step 3. Reconnect power to the actuator and command the heating coil valve to full open.

Step 4. Verify that the control system does not report a fault.

Step 5. From the control system workstation, command the cooling coil valve to the full open position by temporarily setting the space cooling set-point lower than the current space temperature, if the system is not in cooling mode.

Step 6. Disconnect power to the actuator and verify that a fault is reported.

Step 7. Reconnect power to the actuator and command the cooling coil valve to full open.

Step 8. Verify that the control system does not report a fault.

Improper Mode Fault Tests

The ATT failed to follow the steps below or it is a failed test.

Step 1. From the control system workstation, override the heating coil valve and verify that the control workstation reports a fault.

Step 2. From the control system workstation, override the cooling coil valve and verify that the control workstation reports a fault.

Step 3. From the control system workstation, override the mixing box dampers and verify the control workstation reports a fault.

Terminal Unit (VAV box) Tests

The ATT failed to follow the steps below or it is a failed test.

1 Sensor drift/failure

Step 1. Disconnect the tubing to the differential pressure sensor of the VAV box.

Step 2. Verify the control system detects and reports the fault.

Step 3. Reconnect the sensor and verify proper sensor operation.

Step 4. Verify that the control system does not report a fault.

2 Damper/actuator fault – damper stuck open

Step 1. Command the damper to be fully open. Override the space temperature set-point below the current space temperature to force the system into maximum cooling. Another option is to command the VAV box to the maximum position through the control workstation.

Step 2. Disconnect the actuator to the damper.

Step 3. Adjust the cooling set-point such that the room temperature is below the cooling set-point to command the damper to the minimum position. Verify that the control system reports a fault.

Step 4. Reconnect the actuator and restore to normal operation.

3 Damper/actuator fault – damper stuck closed

Step 1. Set the damper to the minimum position.
Step 2. Disconnect the actuator to the damper.
Step 3. Set the cooling set-point below the room temperature to simulate a call for cooling. Verify that the control system reports a fault.
Step 4. Reconnect the actuator and restore all set-points to their original values to resume normal operation.

4 Valve/actuator fault (For systems with hydronic reheat)

This test is only applicable to systems with hydronic reheat.

Step 1. Command the reheat coil valve to (full) open by setting the heating set-point temperature above the space temperature set-point. Wait for the controls to respond to the command to open the reheat coil valve.
Step 2. Disconnect power to the actuator. Set the heating set-point temperature to be lower than the current space temperature, to command the valve closed. Verify that the fault is reported at the control workstation.
Step 3. Reconnect the actuator and restore all set-points to their original values to resume normal operation.

5 Feedback loop tuning fault

Step 1. Set the integral coefficient of the box controller (reset action) used for airflow control to a value 50 times the current value. Reduce the space temperature set-point to be 3°F below the current space temperature to simulate a call for cooling.
Step 2. Verify the damper cycles continuously over a period of several minutes. (The cycling period time depends on the type of controller used but is typically on the order of a few minutes.) Verify that the control system detects and reports the fault.
Step 3. Reset the integral coefficient of the controller to its original value and reset the space set-point to its original value to restore normal operation.

6 Disconnected inlet duct

Step 1. From the control system workstation, command the damper to a minimum position (full closed) by raising the space temperature set-point.
Step 2. Then disconnect power to the actuator and verify that a fault is reported at the control workstation.
Step 3. Reset the space temperature set-point back to its original value.

7 Discharge air temperature sensor

Step 1. Adjust zone set-points to drive the box from dead band to full heating.

Step 2. Verify the supply air temperature resets to the maximum set-point while the airflow maintains at the dead band flow rate.

Step 3. Verify that the airflow rate increases to the heating maximum flow rate to meet the heating load.

NA7.5.13 Distributed Energy Storage DX AC System Acceptance (Document NRCA-MCH-14-A)

Construction Inspection Failures

1. The ATT fails to verify the water tank is filled to the proper level.
2. The ATT fails to verify the water tank is sitting on a foundation with adequate structural strength to support the weight of the filled vessel
3. The ATT fails to verify the water tank is insulated and the top cover is in place.
4. The ATT fails to verify the DES/DXAC is installed correctly (refrigerant piping, etc.).
5. The ATT fails to verify the correct model number is installed and configured.

Functional Test Failure

The ATT failed to follow one or more of the steps.

Step 1. Simulate cooling load during daytime period. Verify and document that

- The supply fan operates continually;
- If the system has ice storage, verify that the DES/DXAC runs in ice melt mode and that the compressor remains off. The supply fan operates continuously to provide cooling to the space. The refrigerant pump operates to circulate refrigerant to the evaporator coil(s).
- If the DES/DXAC system has no ice and there is a call for cooling, verify that the DES/DXAC system runs in direct cooling mode, with the compressor running. Verify that cooling is provided to the space.

Step 2. Simulate no cooling load during daytime conditions. Verify and document that

- Supply fan operates as per the facility thermostat or control system.
- The DES/DXAC and the condensing unit do not run.

Step 3. Simulate no cooling load during the morning shoulder time period (before noon).Verify and document that the DES/DXAC system remains idle.

Step 4. Simulate a cooling load during the morning shoulder time period (between 6 am and noon). Verify and document that

- The DES/DXAC system runs in direct cooling mode, with the compressor running; and
- The tank does not discharge during this period.

Step 5. Set the date and time back to the current date and time after completion of the acceptance tests, following manufacturer's instructions.

NA7.5.14 Thermal Energy Storage (TES) System Acceptance (Document NRCA-MCH-15-A)

Construction Inspection Failures

ATT fails to verify the following chiller information is provided on the plans to document the key TES System parameters.

1. Chiller(s)
   - Manufacturer Brand and Model
   - Type (Centrifugal, Reciprocating, etc) and quantity
   - Heat rejection type (air, water, other)
   - Charge mode capacity (tons) at average fluid temperature
   - Discharge mode capacity (tons) at temperature
   - Discharge mode efficiency (kW/ton or EER) at design ambient temperature
   - Charge mode efficiency at nighttime design ambient temperature (kW/ton or EER)
   - Fluid type and percentage (nameplate)
2. Storage
   - Type (Ice-on-Coil Internal Melt, Ice-on-Coil External Melt, Encapsulated (e.g. ice balls), Ice Harvester, Ice Slurry, Other Phase Change Material (e.g. paraffin), Chilled Water, Brine (or chilled water with additives), Eutectic Salt, Clathrate Hydrate Slurry (CHS) Cryogenic, Other (specify)
   - Brand and Model
   - Number of Tanks
   - Height/width/depth, or height/diameter (if custom tanks)
   - Storage capacity per tank (ton-hours) at entering/leaving temperatures and hours discharged
   - Storage rate (tons) at flow rate (gpm) per tank
   - Minimum charging temperature based on chiller and tank selections
   - Discharge rate (tons) at entering/leaving temperatures and hours discharged

Functional Test Failure

The ATT failed to follow one or more of the steps.

Step 1. TES System Design Verification. The ATT verifies the installing contractor certified the following information:

- Chiller(s) start-up procedure has been completed
- System fluid test and balance has been completed
- Air separation and purge has been completed

- Fluid (e.g. glycol) has been verified at the concentration and type indicated on the design documents
- The TES system has been fully charged at least once and charged duration noted
- The system has been partially discharged at least once and discharged duration noted
- The system is in partial charge state in preparation for Step 2
- Schedule of operation has been activated as designed
- Mode documentation describes the state of system components in each mode of operation

Step 2. TES System Controls and Operation Verification. The ATT shall verify the following information:

- The TES system and the chilled water plant is controlled and monitored by an EMS.
- The system has controls in place configured for the operator to manually select each mode of operation or use an EMS schedule to specify the mode of operation.
- The scheduled operations listed below, not the times when the system will be in each mode of operation:
  - ✓ **Storage/charge mode**. Manually select storage mode. Verify that the TES system stores energy. If the TES operates on a schedule, note the times, what causes the TES to engage, and that the TES system enters energy storage mode.
  - ✓ **End of charge signal**. Simulated a full storage charge by changing the thermal storage manufacturer's recommended end of charge output sensor to the EMS. Verify that the storage charging stops.
  - ✓ **Discharge Mode**. Simulate a call for cooling. Manually select storage only discharge mode. Verify that the TES system starts discharging with the compressors off. Return to the off/secured mode. If the TES operates on a schedule, note times, what causes the TES to engage, and that the TES system starts discharging with the compressor(s) off.
  - ✓ **Mechanical cooling only mode**. Simulate a call for cooling. Manually select mechanical cooling only mode and verify that the storage does not discharge and the cooling load is met by the compressor(s) only. Return to the off/secured mode. If the TES operates on a schedule, not the times, what causes the TES to engage, and that the storage does not discharge and the cooling load is met by the compressor(s) only.
  - ✓ **Discharge and mechanical cooling mode**. Simulate a call for cooling. Manually select discharge and mechanical cooling mode. Verify that the TES system discharges with the chiller(s) sharing the load. Return to the off/secured mode. If the TES operates on a schedule, not the times, cause

the TES to engage, and verify that the storage starts discharging with the compressor(s) sharing the load.

- ✓ **Off/storage-secured mode**. Manually select the off/storage-secured mode. Verify that the storage does not discharge and all compressors are off. If the TES operates on a schedule, note the times, what causes the TES to engage, and that the storage does not discharge and all compressor(s) are off, regardless of the presence of calls for cooling.
- ✓ **Charge plus cooling mode**. If the provisions for this mode have been made by the system designer, verify that the tank(s) can be charged while serving an active cooling load, simulated by generating a call for cooling and entering the charge mode either manually or by time schedule. If the system disallows this mode of operation, verify that energy storage is disallowed or discontinued while an active cooling load is present.

NA7.5.15 Supply Air Temperature Reset Controls Acceptance (Document NRCA-MCH-16-A)

Construction Inspection Failures

1. The ATT fails to verify supply air temperature reset controls are installed per the requirements of the 2016 Energy Standards §140.4(f).
2. The ATT fails to document all system air temperature sensor(s) are factory or field calibrated.
3. The ATT fails to document the current supply air temperature.

Functional Test Failure

The ATT failed to follow one or more of the steps.

Step 1. During occupied mode, adjust the reset control parameter to decrease the supply air temperature (to the lower supply temperature limit). Verify and document that

- Supply air temperature controls modulate as intended.
- Actual supply air temperature decreases to meet the new set point within +/- 2°F.
- Supply air temperature stabilizes within 15 minutes.
- Document both supply air temperature set-point and actual supply air temperature.

Step 2. During occupied mode, adjust the reset control parameter to increase the supply air temperature (to the upper supply temperature limit). Verify and document that

- Supply air temperature controls modulate as intended.
- Actual supply air temperature decreases to meet the new set point within +/- 2°F.

- Supply air temperature stabilizes within 15 minutes.
- Document both supply air temperature set-point and actual supply air temperature.

Step 3. Restore reset control parameter to automatic control. Verify and document that

- Supply air temperature controls modulate as intended.
- Actual supply air temperature decreases to meet the new set point within +/- 2°F. Document both supply air temperature set-point and actual supply air temperature.
- Supply air temperature stabilizes.

NA7.5.16 Condenser Water Temperature Reset Controls Acceptance (Document NRCA-MCH-17-A)

Construction Inspection Failures

1. The ATT fails to check if the condenser water supply system and control system are installed per the system design, as documented on the building plans or as-builts.
2. The ATT fails to check if condenser water supply temperature control sequence, including condenser water supply high and low limits, are available and documented in the building documents.
3. The ATT fails to check if all cooling tower fan motors are operational, cooling tower fan speed controls are installed, operational, and connected to cooling tower fan motors per OEM start- up manuals and sequence of operation.
4. The ATT fails to check if cooling tower fan control sequence, including tower design wet bulb temperature and approach, are available and documented in the building documents.
5. The ATT fails to check if the following temperature sensors are installed per plans: outdoor air dry-bulb and wet-bulb, entering condenser water, and leaving chilled water. Note any discrepancies on the Acceptance Document.
6. The ATT fails to check all ambient dry bulb temperature, and relative humidity/wet bulb sensors used by controller must be factory calibrated (with certificate), field calibrated by TAB technician or other technician (with calibration results), or field checked against a calibrated reference standard by test technician (with results). Attach supporting documentation to the Acceptance Document. When field calibrating temperature sensors, it is recommended that you perform a “through system” calibration that compares the reference reading to the reading at the EMCS front end or inside the controller (e.g. it includes any signal degradation due to wiring and transducer error).
7. The ATT fails to document the following from the control system or using test sensors:
   - Current outdoor air dry bulb and wet bulb temperatures
   - Current entering condenser water supply temperature
   - Current leaving chilled water temperature

Functional Test Failure

The ATT failed to follow one or more of the steps.

Step 4. Adjust the reset control parameter to decrease the condenser water temperature (toward the lower supply temperature limit). Verify and document that
- Condenser water temperature controls modulate as intended.
- Actual condenser water supply temperature decreases to meet new set point within ± 2°F.
- Cooling tower fan(s) stage properly and/or adjust speed accordingly to meet lower set point.
- Chiller load amps decrease.

Step 5. Adjust the reset control parameter to increase the condenser water temperature (toward the upper supply temperature limit). Verify and document that
- Condenser water temperature controls modulate as intended.
- Actual condenser water supply temperature increases to meet new set point within
- ± 2°F.
- Cooling tower fan(s) stage properly and/or adjust speed accordingly to meet upper set point.
- Chiller load amps increase.

Step 6. Restore reset control parameter and system to automatic control. Verify and document that
- Condenser water temperature controls modulate as intended.
- Actual condenser water supply temperature changes to meet new set point within ± 2°F.
- Cooling tower fan(s) stage properly and/or adjust speed accordingly to meet set point.
- All equipment returns to normal operation.

Energy Management Control System Acceptance (Document NRCA-MCH-18-A)

Construction Inspection Failures

The ATT fails to ensure the following actions have been completed:

1. Factory start-up and check-out complete
2. I/O point lists available
3. Point-to-point verification completed
4. Sequence of operations of each system are programmed
5. Written sequences are available
6. Input sensors are calibrated

Functional Test Failure

The ATT failed to follow one or more of the steps.

Conduct the following verification checks to validate the functionality of the EMCS:

1. Verify the control graphics represent the system configuration.
2. Verify control points are properly mapped to the graphics screen.
3. Raise and lower a sampling of space temperature set-points in the software and verify the system responds appropriately.
4. Verify the time-of-day start-up and shut-down function initiates a proper system response.
5. Verify trending capabilities by establishing trend logs for a sampling of control points.
6. Verify alarm conditions are monitored.
7. Verify the EMCS panel is installed on an emergency power circuit or has adequate battery back-up.

6.12Paper Audit Pass/Fail Criteria

The purpose of the paper audit is to verify that the individual acceptance test form has been completed correctly.

The ATT fails a paper audit if

1. **Project Information** on top of each page of the NRCA-MCH documents is incomplete or missing.
2. **Construction Inspection** information is missing or incomplete, i.e., the appropriate boxes have not been checked or pertinent information has not been provided.
3. **Functional Inspection** information is missing or incomplete, i.e., the appropriate boxes have not been checked or pertinent information has not been provided.
4. If applicable, **Testing Calculations and Results** information is missing or incomplete, i.e., the appropriate boxes have not been checked or pertinent information has not been provided.
5. **Evaluation** information is missing or incomplete.
6. The **Documentation Author's Declaration Statement** has not been completed or information is missing.
7. The **Field Technician's Declaration Statement** has not been completed or information is missing.

The **Responsible Person's Declaration Statement** has not been completed or information is missing

6.13 Accreditation Program for Personnel Certification Bodies under ANSI/ISO/IEC 17024

The American National Standards Institute (ANSI) currently administers two accreditation programs for personnel certification agencies. The first accreditation program is based on the International Standard ANSI/ISO/IEC 17024 and the second is based on The Conference for Food Protection Accreditation Standards for certification agencies that certify food protection managers.

The process used by ANSI to accredit certification bodies is based on an international standard (ISO/IEC 17011). Adherence to a rigorous internationally recognized accreditation process ensures that the ANSI process conforms to the highest accreditation standard and represents the best practices in accreditation. ANSI is the only personnel certification accreditation body in the United States to meet nationally accepted practices for accreditation bodies.

The ANSI accreditation process involves both a review of a paper application and the performance of an assessment (onsite visit) to validate information provided by each applicant. The use of an onsite assessment for accreditation of personnel certification agencies is unique to ANSI.

Close to one million professionals currently hold certifications from organizations accredited under ANSI's personnel certification programs.

ANSI accreditation is recognized both nationally and internationally and has become the hallmark of a quality certification program. Unique features of ANSI accreditation are:

- ANSI accreditation involves not only review of the submitted material but also a site visit to ensure that compliance with the requirements and verify documents that have been submitted prior to the on-site visit. Due to a high degree of integrity and confidence that is associated with ANSI accreditation process, ANSI accreditation is generally recognized as the highest standard in personnel certification accreditation.
- The standard used by ANSI to accredit certification bodies is an American National Standard as well as an ISO/IEC Standard. Accreditation to an international standard is extremely important for certification bodies that have global operations or aspirations. The American National Standard is important to facilitate government recognition.
- ANSI follows an internationally recognized process for accrediting organizations. ANSI conducts its accreditation in accordance with the requirement of ISO/IEC 17011-Conformity Assessment - General Requirements for Accreditation Bodies accrediting Conformity Assessment Bodies. This International Standard is the foundational Standard that is used to recognize ANSI accreditation in any multilateral and/or mutual recognition agreements.
- ANSI has a historical track record of successfully conducting accreditation of certification programs drawn from different industrial sectors from not-for-profits, large multinational corporations, and government agencies (in process).

U.S. Government Recognition

The U.S. Government is increasingly relying on ANSI accreditation for verification of quality of certification programs and to control fraud and misuse in certain industries. In view of the proliferation of certification programs and the need to help the consumers make informed decisions, government agencies are looking to ANSI accreditation to differentiate quality programs and improve practices in industry. The ANSI accreditation process is designed to increase the integrity, confidence, and mobility of certified professionals. Some of the government agencies that are closely associated with ANSI accreditation include:

- Food and Drug Administration
- Department of Defense
- State Regulation
- Massachusetts Securities Commission
- Occupational Safety and Health Administration

TABB Reports to ANSI

Attachment 6.3 lists three reports which are required by ANSI to review and assess the performance of the TABB certification for testing, adjusting and balancing technicians and supervisors. TABB-certification in testing, adjusting and balancing is a prerequisite for technicians to become certified as a Mechanical Acceptance Testing Technician Level 2.

6.14 Annual Surveys of Building Departments Regarding Mechanical Acceptance Testing

NEMIC will develop a database of all building departments and building officials in the state of California. The primary purpose of the database is to be able to electronically communicate with the building officials and notify them of the activities of the NEMIC ATTCP as well as provide the building officials with an up-to-date listing of certified mechanical Acceptance Testing Technicians and their employers as well as any changes to the certification status of a technician or his/her employer.

The same database will be employed to conduct annual surveys of the building officials with regard to mechanical acceptance testing. The survey instrument is yet to be developed and will be drafted in conjunction with the California Energy Commission staff.

7 Certification Identification Number and Verification of ATT Status

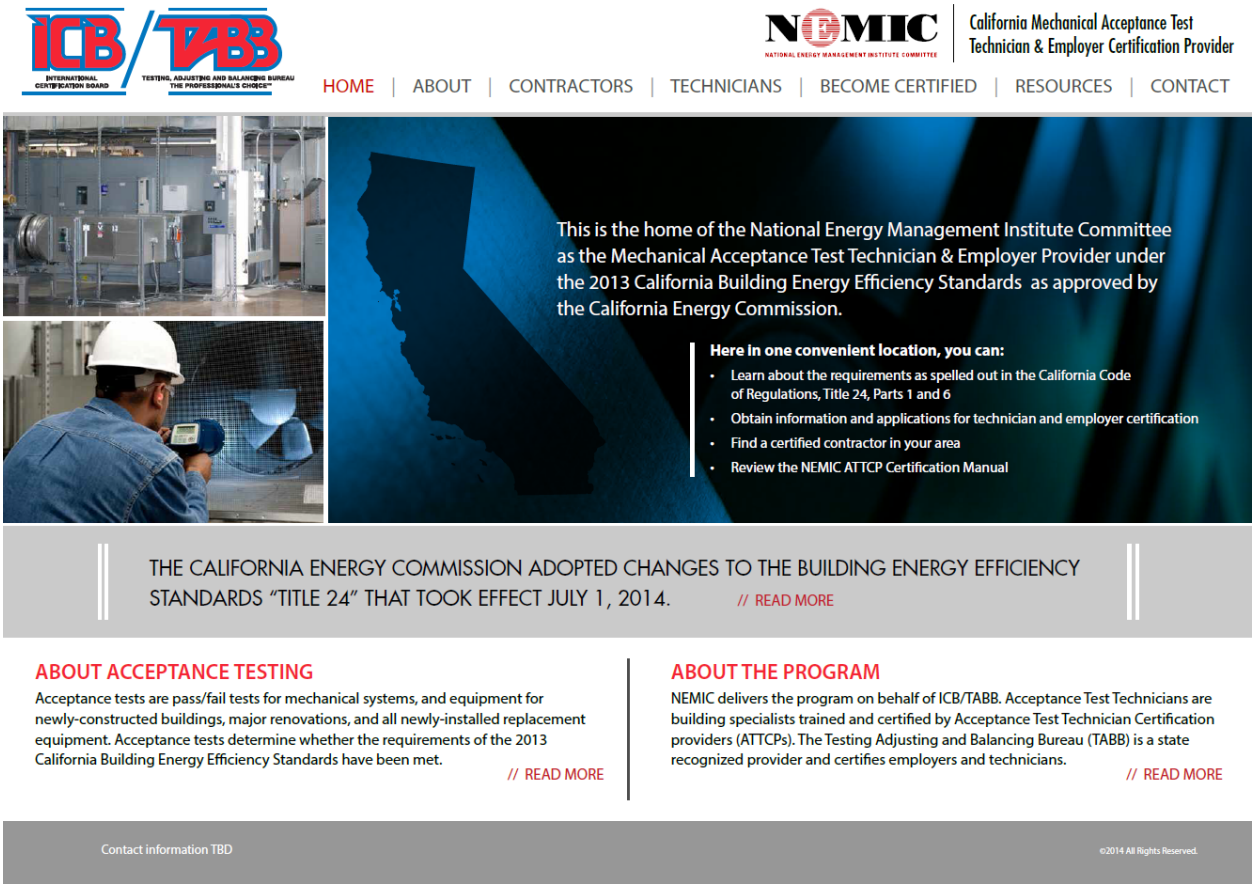
This section addresses CCR Title 24 Part 1 Section 10-103.2(c)3G, i.e., document how the NEMIC will issue a unique certification identification number to the ATT; maintain an accurate record of the certification status for all ATTs that the NEMIC has certified; provide verification of current ATT certification 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 according to all applicable requirements in Sections 10-103.2, 10-102, 10-103(a)4, and Reference Joint Appendix JA7.

The NEMIC ATTCP maintains a website at http://www.attcp.org and http://www.nemic-attcp.org, which is: (a) a repository for all information concerning the NEMIC ATTCP, its certification procedures, (b) provides a listing of each certified ATT and ATE, (c) provides a mechanism for filing complaints regarding the performance of ATTs and (d) provides other pertinent information. Each ATT candidate who has passed the certification exam is assigned a unique certification number. The certification number clearly identifies the type of certification held. The website will be linked to a database of certified ATTs and ATEs and the ATT will be linked to his or her ATE by the certification number. The database will be accessible to the Enforcement Agency personnel and the public.

The website listing will display the certification status of each ATT and ATE as well. The certification status will be expressed as:

- *Certification is current*. This status is expressed when the ATT and its respective employer both have successfully passed their respective certification exams or have both successfully renewed their respective certification as stated in the NEMIC Certification Manual.
- *Certification is revoked*. This status is expressed when the ATT's certification or that of their respective employer has been revoked according to Sections 2.4 and 2.7 of the NEMIC Certification Manual.

A sample of the www.attcp.org home page is shown on the following page. The database of registered ATTs and ATEs will share that information with the Registry. Other enhancements to the website will be made as information needs are recognized. The website is currently operational and available to the public.



8 Annual Reports

This section addresses CCR Title 24 Part 1 Section 10-103.(d), i.e., document how NEMIC will

a. Provide an annual report to the Energy Commission summarizing the certification services provided over the reporting period, including the total number of Acceptance Test Technicians and Employers certified by the agency (a) during the reporting period and (b) to date.
b. Report to the Energy Commission what adjustments have been made to the training curricula, if any, to address changes to the Building Energy Efficiency Standards Acceptance Testing requirements, adopted updates to the Building Energy Efficiency Standards or to ensure training is reflective of the variety of lighting controls that are currently encountered in the field, no less than six months prior to the effective date of any newly adopted, or amendment to existing Building Energy Efficiency Standards.

The Administrator of the NEMIC ATTCP will fulfill this reporting function. At a minimum the report will include:

- A list of certified Acceptance Testing Technicians and their respective certified Acceptance Testing Employers. The list will indicate the certification status as listed in Section 7 of this document.
- A list of all adjustments to the certification process if any were made
- A list of all adjustments to the training curricula if pertinent changes have been made to the Building Energy Efficiency Standards.
- The reporting period will be from January 1 through December 31 of the year of interest and the report will be delivered by March 31 of the following year.