DOCKETED	
Docket Number:	13-ATTCP-01
Project Title:	Acceptance and Training Certification
TN #:	223641
Document Title:	NEMIC Staff Report
Description:	Mechanical Acceptance Test Technician Certification Provider 2016 Update Review: National Energy Management Institute Committee
Filer:	Cathy Hickman
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	6/1/2018 11:44:40 AM
Docketed Date:	6/1/2018

Mechanical Acceptance Test Technician Certification Provider 2016 Update Review: National Energy Management Institute Committee

Compliance Review for the *2016 California Building Energy Efficiency Standards*

California Energy Commission

Edmund G. Brown Jr., Governor

May 2018 | CEC-400-2018-013

California Energy Commission

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ABSTRACT

Per the requirements in Section 10-103.2(d) of the *2016 Building Energy Efficiency Standards*, mechanical Acceptance Test Technician Certification Providers must report to the California Energy Commission adjustments that have been made to the training curricula to address adopted updates to the *Building Energy Efficiency Standards*. The Energy Commission adopted the *2016 Building Energy Efficiency Standards* on November 12, 2015, and they went into effect on January 1, 2017. Energy Commission staff notified the National Energy Management Institute Committee on February 12, 2016, that it must develop a report of adjustments it will make to its training curricula and application to address new and modified requirements in the *2016 Building Energy Efficiency Standards*. The National Energy Management Institute Committee submitted its update report on January 17, 2017, and an amendment to the update report on March 29, 2018. On April 27, 2018, staff determined that National Energy Management Institute Committee's amended 2016 update report was complete.

Staff evaluated the training curricula adjustments and other application amendments submitted by the National Energy Management Institute Committee submitted in its amended 2016 update report. Staff determined the proposed training updates and other application amendments the National Energy Management Institute Committee submitted meet the requirements of Section 10-103.2(c) of the 2016 *Energy Standards*. Staff recommends approval of the National Energy Management Institute Committee's 2016 training curricula adjustments and other application amendments.

Keywords: Nonresidential mechanical Acceptance Test Technician Certification Provider, National Energy Management Institute Committee, mechanical systems, acceptance testing, Building Energy Efficiency Standards

Please use the following citation for this report:

Loyer, Joe. April 2018. *Mechanical Acceptance Test Technician Certification Provider 2016 Updates Review: National Energy Management Institute Committee*. California Energy Commission. Publication Number: CEC-400-2018-013.

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EXECUTIVE SUMMARY

The mechanical Acceptance Test Technician Certification Provider program provides training, certification, and oversight of technicians who perform acceptance tests required by California's *Building Energy Efficiency Standards*, as well as employers. Providers are professional organizations approved to provide the training curricula, as well as certification procedures, complaint resolution (including disciplinary procedures), quality assurance, and accountability measures to technicians and their employers. Acceptance testing ensures that installed equipment, controls, and systems in nonresidential buildings operate as required by the *Building Energy Efficiency Standards*.

Per Section 10-103.2(d) of the *2016 Building Energy Efficiency Standards*, providers are required to report to the California Energy Commission adjustments that have been made to training curricula to address changes to acceptance testing requirements or to adopted updates to the *Building Energy Efficiency Standards*. This update report must be submitted no less than six months before the effective date of any newly adopted *Building Energy Efficiency Standards*. All reports shall contain a signed certification that all requirements have been met.

Providers must also demonstrate to the Energy Commission that their acceptance testing certification services will comply with any applicable updates if their previously approved application does not comply with new or modified requirements. The training curricula adjustments and any other application amendments shall be reviewed by the Energy Commission according to criteria in Section 10-103.2(f) to determine if providers have satisfied the requirements under the *Building Energy Efficiency Standards*. The Energy Commission adopted the *2016 Building Energy Efficiency Standards* on November 12, 2015, and they went into effect on January 1, 2017.

The Energy Commission approved the National Energy Management Institute Committee as a nonresidential mechanical Acceptance Test Technician Certification Provider on March 11, 2015. On February 12, 2016, Energy Commission staff notified the National Energy Management Institute Committee that it must develop a 2016 update report detailing adjustments it will make to its training curricula and application to address new and modified requirements in the *2016 Building Energy Efficiency Standards*. The National Energy Management Institute Committee submitted its update report on January 17, 2017. Staff found that the quality assurance program proposed by the National Energy Management Institute Committee was not compliant with the *2016 Building Energy Efficiency Standards*. The National Energy Management Institute Committee submitted an amended version to its 2016 update report on March 29, 2018. In its final update report, the National Energy Management Institute Committee described its intent to meet the quality assurance requirements under the 2019 *Building Energy Efficiency Standards* in place of requirements for the *2016 Building Energy Efficiency Standards*.

Energy Commission staff reviewed the National Energy Management Institute Committee amended 2016 update report and found that the quality assurance program meets the quality

assurance requirements of the 2019 *Building Energy Efficiency Standards* and that the training curriculum adjustments and other application amendments meet the requirements of Section 10-103.2(c)3 of the *2016 Building Energy Efficiency Standards*.

CHAPTER 1: Background

The Mechanical Acceptance Test Technician Certification Provider Program

The Acceptance Test Technician Certification Provider (ATTCP) program provides training, certification, and oversight of acceptance test technicians (ATTs) who perform the acceptance tests required by California's *Building Energy Efficiency Standards* (Energy Standards), as well as Acceptance Test Employers (ATEs). ATTCPs are professional organizations approved by the California Energy Commission to provide training curricula for ATTs and their ATEs. They also provide certification procedures, complaint resolution (including disciplinary procedures), quality assurance, and accountability measures.

Acceptance testing ensures that installed equipment, controls, and systems in nonresidential buildings operate as required by the Energy Standards. The ATTCP program was developed to improve compliance with lighting controls and mechanical acceptance test requirements.

Requirements for 2016 Update Report

In accordance with Section 10-103.2(d) of the 2016 Energy Standards (codified in Title 24, Part 6, of the California Code of Regulations), mechanical ATTCPs are required to report to the Energy Commission adjustments that have been made to the training curricula to address changes to mechanical system acceptance testing requirements or any adopted updates to the Energy Standards. The reports must be submitted no less than six months prior to the effective date of any newly adopted Energy Standards and shall contain a signed certification that the mechanical ATTCP meets all requirements for this program. Mechanical ATTCPs must also demonstrate to the Energy Commission that their acceptance testing certification services will comply with any applicable updates to the Energy Standards if their approved 2013 application does not comply with the requirements for mechanical ATTCPs in the 2016 Energy Standards.

Update reports submitted by mechanical ATTCPs are considered application amendments. According to Section 10-103.2(f) of the 2016 Energy Standards, "Amendments that contain any substantive changes shall be subject to the application review and determination process specified in Section 10-103.2(e)." As such, staff will evaluate the training curricula adjustments and other application amendments contained within 2016 update reports to determine if a mechanical ATTCP's training, certification, and oversight services comply with the criteria and procedures set forth in Section 10-103.2(c)3 of the 2016 Energy Standards.

Issues Regarding the 2016 Quality Assurance Requirements

The 2016 Energy Standards modified the requirement for mechanical ATTCPs to perform on-site quality assurance inspections. While ATTCPs already met the minimum requirements (if not exceeded) for paper audits, the mechanical ATTCPs indicated they would be unable to meet the

minimum level of on-site acceptance test samples required. As a result, Energy Commission staff entered into discussions with the mechanical ATTCPs regarding a revision to the quality assurance regulations in Section 10-103.2(c)3F for mechanical ATTCPs and proposed changes for the 2019 Energy Standards.[1] The 2019 Energy Standards addressed issues raised by the mechanical ATTCPs by allowing quality assurance inspectors to enter an active construction site and follow ATTs as they perform the acceptance test in real time (referred to as *shadow-auditing*). Furthermore, it requires an on-site inspection rate equal to that required by the 2016 Energy Standards. The mechanical ATTCPs agreed that the quality assurance requirements in Section 10-103.2(c)3F of the 2019 Energy Standards are implementable. Therefore, staff will recommend that the Energy Commission approve mechanical ATTCP quality assurance programs that meet the requirements in Section 10-103.2(c)3F of the 2019 Energy Standards, viewing them as equivalent to complying with Section 10-103.2(c)3F of the 2016 Energy Standards.

National Energy Management Institute Committee

The Energy Commission adopted the 2016 Energy Standards on November 12, 2015, and they went into effect on January 1, 2017. Energy Commission staff notified the National Environment (NEMIC) on February 12, 2016, that it must develop a 2016 update report detailing the adjustments it would make to its training curricula and application to address the new and modified requirements in the 2016 Energy Standards.

NEMIC did not submit its 2016 update report to the Energy Commission for review within the six months allowed by regulation. NEMIC was permitted to delay the submission of its update report until January 17, 2017. However, staff raised concerns over the NEMIC's proposed quality assurance program, and the Energy Commission found the program noncompliant. Following quality assurance discussions on the 2019 Energy Standards and taking into account the solution proposed to allow mechanical ATTCPs to comply with the 2019 quality assurance requirements for the 2016 code cycle, NEMIC submitted an amended 2016 update report on March 29, 2018.

Energy Commission staff determined that NEMIC's 2016 update report was complete on April 27, 2018. Staff reviewed NEMIC's 2016 update report according to the review and determination process specified in Section 10-103.2(e) of the 2016 Energy Standards. Staff found that NEMIC's proposed quality assurance measures comply with Section 10-103.2(c)3F of the 2019 Energy Standards and the rest of NEMIC's application amendments proposed in its 2016 update report comply with the requirements in Section 10-103.2(c) of the 2016 Energy Standards.

1 See Appendix B: Excerpt of the Quality Assurance Requirements for the 2019 Energy Standards.

CHAPTER 2:
Mechanical ATTCP 2016 Update Report Evaluation

Staff identified the changes from 2013 to 2016 for mechanical systems acceptance testing to help ease the mechanical ATTCPs' transition to the 2016 Energy Standards. Staff identified two main categories of regulatory changes as defined by Section 10-103.2(f)1: substantive and nonsubstantive changes.

The first section of this chapter discusses the regulatory changes that staff deemed substantive based on the associated effect on mechanical ATTCPs at the organizational level: the modified quality assurance requirements in Section 10-103.2(c)3F of the 2016 Energy Standards. The second section of this chapter discusses changes that staff deemed nonsubstantive because they do not significantly alter the requirements of the application materials for the mechanical ATTCPs, ATTs, or ATEs.

Substantive Changes

Quality Assurance - Title 24, Part 1, Section 10-103.2(c)3F

The mechanical ATTCP shall describe in its application to the Energy Commission how its certification business practices include quality assurance and accountability measures including, but not limited to, independent 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 the Energy Standards.

The mechanical ATTCP shall review a random sample of no fewer than percent of each technician's completed compliance forms (desk audit). The mechanical ATTCP shall also perform randomly selected on-site shadow audits of no less than one percent of each employer's overseen projects by following the assigned technician tasked with observing the performance on the job site (on-site audit).

Independent oversight may be demonstrated by accreditation under the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC) 17024 standard.

Summary of NEMIC's Compliance Method

ICF Incorporated, LLC (ICF) will provide the necessary compliance with the quality assurance requirements in Section 10-103.2(c)3F of the 2019 Energy Standards, in addition to other services. California Advanced Lighting Controls Training Program (CALCTP), a lighting controls ATTCP, also employed ICF for the same purposes since its approval on August 15,

2014.

ICF will perform both the desk (or paper) audits at a rate of no less than 1 percent of each ATT's submitted acceptance test forms per year and on-site audits at a rate of no less than 1 percent of each ATE's projects each calendar year.

The ICF will perform on-site audits using the "job shadow" method. NEMIC will record and make available to the Energy Commission all remedial actions resulting from an audit. This record will include remediation and/or disciplinary actions such as retraining, suspension, or revocation of an ATE's or ATT's certification.

Audit Sampling

NEMIC and ICF have designed a quality assurance audit program using best practices around a quality assurance audit model. NEMIC will 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."

For new programs, the AICPA recommends that 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 quality assurance program 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 percent 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 percent confidence level in Years 3 to 5 and then a 90 percent confidence level when the program is established in Year 5 and beyond (Table 1).

Table 1: Progressive Audit Sampling Rate

Period	Confidence Level	Percent of Projects Audited[1]	Paper Audits	On-Site Audits
2016/2019 Energy Standards	98percent	4percent	3percent	1percent
2022 Energy Standards	95percent	2percent	1percent	1percent

Source: NEMIC 2016 Update Report, March 29, 2018

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 a year. If more projects are completed the percentage of projects audited will decrease. CALCTP conducted 8,000 audits in 2017.

Project Auditing Selection Process

NEMIC requires that the ATE identify all projects that they have been hired to perform. Compliance forms will not be issued to ATTs unless their ATE has registered the project. Failure to register a project will result in warning to the ATE, followed by a written reprimand for a second offense, and decertification of the ATE for a third offense.

NEMIC will grant ICF access to its project registry for random paper audit and on-site audit selection. Projects selected for paper audits will be completed projects and will occur without notice to the ATE or ATT. The ATE, ATT, and NEMIC will be notified of the results and any recommended actions to be taken. The on-site audits will be randomly selected from projects in the process of acceptance testing (that is, an active project). ICF will allow the ATE to accumulate about 40 to 50 projects before selecting an active project. The ICF inspector will be dispatched to the project site on the date of the acceptance testing as recorded (and updated) by the ATE. If the acceptance test is not performed on that date, it is considered a failed test. The quality assurance inspector will shadow the ATT as he or she performs the acceptance test and record any errors observed. The quality assurance inspector will then submit a report to ICF of all results and recommendations.

Results of Failed Audits

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 an acceptance test.
- Failure to verify equipment information is posted.
- Failure to verify installed mechanical controls are certified to the Energy Commission.

A failed test occurs when at least one of the threshold specifications is not met during testing and inspection. NEMIC has developed a set of threshold specifications identifying specific pass/fail criteria for each mechanical installation requiring acceptance testing. A description of threshold specifications is listed in Section 11 of NEMIC's 2016 update report.

If an ATT fails either a paper quality assurance audit or an on-site-quality audit, the 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 additional scrutiny as listed in Table 2.

Table 2: Results of Audit Failure

Result	Percent of Projects Audited	Action That Will Be Taken
Failed either a paper or on-site quality assurance audit	50 percent of future projects audited until they have passed 2 on-site audits	On-Site Quality Assurance Audit only
Failed a second quality assurance audit, the second is an on-site audit	100 percent of future projects audited, until passed 4 on-site audits	On-Site Quality Assurance Audit Only
Failed a third quality assurance audit, while still in the failed pool.		ATT decertified according to NEMIC's ATTCP Certification Manual Section 3.5

Source: NEMIC 2016 Update Report, March 29, 2018

Audit Reporting

ICF will report all audit results, both paper audits and on-site audits, to the ATE, ATT, and NEMIC. ICF will maintain a record of all audit results for each ATE and ATT, as well as all remedial actions taken for five years. ICF will make all audit results available to the Energy Commission on request and will include the audit results and all remedial actions taken on the annual report submitted to the Energy Commission in November of each year.

Staff Assessment

Staff reviewed NEMIC's amended application regarding the proposed quality assurance program. The proposed program includes independent 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 the Energy Standards. NEMIC will review no fewer than 1 percent of each ATT's completed compliance forms electronically and will perform randomly selected on-site audits of no fewer than 1 percent of each ATE's overseen projects. Staff determined that NEMIC's proposed quality assurance program complies with the requirements in Section 10-103.2(c)3F of the 2019 Energy Standards.[2]

2 See Attachment B: Excerpt of the Quality Assurance Requirements for the 2019 Energy Standards.

Nonsubstantive Changes

Minor Changes to Title 24, Part 6

The updates in Part 6 of the 2016 Energy Standards that are considered minor do not require a mechanical ATTCP to substantively alter its approved application. While any change to mechanical systems acceptance testing requirements will require mechanical ATTCPs to adjust their training curricula, the minor updates do not require substantive training adjustments – such as entirely new laboratory components or lectures. Instead, the minor changes in the 2016 Energy Standards for mechanical acceptance testing require only slight adjustments compared to the 2013 Energy Standards. Therefore, the mechanical ATTCP must simply demonstrate its training includes the necessary nonsubstance updates to comply with the ATT curricula requirements in Section 10-103.2(c)3B(i) and the ATE training requirements in Section 10-103.2(c)3C.

In compliance with the 2016 Energy Standards, the mechanical ATTCP must demonstrate that its recertification training includes the minor updates. The recertification requirements for the 2016 Energy Standards do not include new tests or hands-on training, though Energy Commission staff encourages mechanical ATTCPs to incorporate those elements where appropriate and possible.

Summary of NEMIC's Compliance Method

NEMIC developed a webinar that each certified ATT and ATE must attend to recertify. The training for ATTs and ATEs is relatively unchanged from the 2013 Energy Standards. The webinar familiarizes ATTs and ATEs with changes to the 2016 Energy Standards and, in particular, any changes to the *Nonresidential Compliance Manual* and the mandated mechanical acceptance tests in the *Nonresidential Appendix NA 7.5*. NEMIC requires that all ATTs and ATEs complete their respective 2016 recertification and sign an affidavit stating that they have attended the webinar and that their respective qualifications have not changed. If the ATTs and ATEs fail to do so, it will result in decertification. NEMIC submitted its updated training materials under confidentiality to the Energy Commission for review and approval.

Staff Assessment

Energy Commission Staff evaluated NEMIC's recertification materials for the 2016 Energy Standards. Staff has determined that NEMIC's 2016 recertification training satisfies the requirements in Section 10-103.2(c)3B(i) of the 2016 Energy Standards for ATTs and in Section 10-103.2(c)3C of the 2016 Energy Standards for ATEs. Staff has also determined that NEMIC's 2016 recertification training satisfies the requirements in Section 10-103.2(c)3B(vi) of the 2016 Energy Standards for recertification. A summary of NEMIC's compliance with Sections 10-103.2(c)3B(i), 10-103.2(c)3B(ii), and 10-103.2(c)3C of the 2016 Energy Standards is provided in Table 3.

Table 3: Summary of Mechanical ATTCP Compliance With Nonsubstantive Title 24, Part 6 2016 Updates

SECTION	UPDATE	MECHANICAL ATTCP APPLICATION AMENDMENT LOCATION(S)	ADEQUATE
110.2	Updates to Tables 110.2-A through 110.2-K to align them with minimum efficiency requirements in ASHRAE 90.1	TN213523-2 California 2016 Building Energy Efficiency Standards for Nonresidential Buildings – Slides 9-12	☒
120.2(i)	Corrects "greater than or equal to" to "greater than" for consistency with ASHRAE 90.1	TN213523-2 California 2016 Building Energy Efficiency Standards for Nonresidential Buildings – Slide 14	☒
120.2(j)	Adds section specifying digital direct controls (DDC) applications and qualifications	TN213523-2 California 2016 Building Energy Efficiency Standards for Nonresidential Buildings – Slide 15	☒
120.2(k)	Revises the requirements for space conditioning systems with DDC to the zone level	TN213523-2 California 2016 Building Energy Efficiency Standards for Nonresidential Buildings – Slide 15	☒
140.4(n)	Adds control requirements when interlocks for doors and windows are present	TN213523-2 California 2016 Building Energy Efficiency Standards for Nonresidential Buildings – Slide 16	☒
NA7.5.11.2.4	Removes functional testing for refrigerant diagnostic sensors	TN213523-2 California 2016 Building Energy Efficiency Standards for Nonresidential Buildings – Slides 34-37	☒

Source: California Energy Commission

CHAPTER 3:
Staff Recommendations

Under Section 10-103.2(f)2 of the 2016 Energy Standards, staff completed its evaluation of the application amendments NEMIC reported in its amended 2016 update report. Staff determined that the substantive adjustment to NEMIC's quality assurance program meets the requirements in Section 10-103.2(c)3F of the 2019 Energy Standards. Staff further determined that the nonsubstantive adjustments to NEMIC's training requirements meet the requirements in Section 10-103.2(c) of the 2016 Energy Standards.

Staff recommends that the Energy Commission approve the NEMIC quality assurance program as meeting the 2019 Energy Standards requirements in place of the 2016 Energy Standards requirements. Staff further recommends that NEMIC's update report be approved to add the 2016 Energy Standards to its existing mechanical ATTCP certification services.

APPENDIX A: Glossary

ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers	Founded in 1894, ASHRAE is a global society focused on building systems, energy efficiency, indoor air quality, refrigeration and sustainability. It serves as a source of technical standards and guidelines.
ATTCP Acceptance Test Technician Certification Provider	An agency, organization, or entity approved by the Energy Commission to train and certify acceptance test technicians and acceptance test employers.
ATT Acceptance test technician	A field technician certified by an authorized acceptance test technician certification provider.
ATE Acceptance test employer	A person, or entity, that employs an acceptance test technician and is certified by an authorized acceptance test technician certification provider.
DDC Digital direct controls	Automated control of a condition or process by a digital device (computer). DDC is often used to control HVAC devices such as valves using microprocessors and software to perform the control logic.
Energy Standards Building Energy Efficiency Standards	State regulations contained in Title 24, Parts 1 and 6 of the California Code of Regulations.
NEMIC National Energy Management Institute Committee	A joint union labor-management trust, approved by the Energy Commission as a nonresidential mechanical ATTCP.

APPENDIX B:
Excerpt of the Quality Assurance Requirements for the 2019 Energy Standards

EXCERPT FROM 2019 BUILDING ENERGY EFFICIENCY STANDARDS

Title 24, Part 1, Section 10-103.2(c)3F

F. Quality Assurance and Accountability. The ATTCP shall describe in its applications to the Energy Commission procedures for conducting quality assurance and accountability activities, including but not limited to the following:

(i) The ATTCPs shall ~~describe in their applications to the Energy Commission how their certification business practices~~ include quality assurance and accountability measures, including but not limited to independent oversight of the certification materials, processes and procedures, visits to building sites where certified technicians are completing acceptance tests, certification process evaluations, building department surveys to determine acceptance testing effectiveness, and expert review of the training curricula developed for Building Energy Efficiency Standards, Section 120.5.

(ii) The ATTCP shall review a random sample of no less than 1 percent of each ~~Technician's~~ ATT's completed compliance forms~~, and shall perform randomly selected on-site audits of no less than 1 percent of each Technician's completed acceptance tests~~. The ATTCP shall also randomly select and shadow audit no less than 1 percent of each ATE's overseen projects, following the assigned ATT and observing their performance on the job site. Independent oversight may be demonstrated by accreditation under the ISO/IEC 17024 standard.