

DOCKETED

Docket Number:	13-ATTCP-01
Project Title:	Acceptance and Training Certification
TN #:	232858-9
Document Title:	Staff Report - 2016 NEBB Update
Description:	N/A
Filer:	Joe Loyer
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	4/28/2020 4:20:48 PM
Docketed Date:	4/28/2020

California Energy Commission

STAFF REPORT

Mechanical Systems Acceptance Test Technician Certification Provider 2016 Updates Review: NEBB

Energy Commission Staff Compliance Review to the
2016 California Building Energy Efficiency Standards

California Energy Commission

Edmund G. Brown Jr., Governor



January 2017 | CEC-400-2017-012

California Energy Commission

Randy Brumley, P.E.

Primary Author(s)

Joe Loyer

Program Manager

Lea Haro, MPhil, PhD

Supervisor

William Dietrich

Manager

EXISTING BUILDINGS AND COMPLIANCE OFFICE

Dave Ashuckian, P.E.

Deputy Director

EFFICIENCY DIVISION

Robert P. Oglesby

Executive Director

DISCLAIMER

Staff members of the California Energy Commission prepared this report. As such, it does not necessarily represent the views of the Energy Commission, its employees, or the State of California. The Energy Commission, the State of California, its employees, contractors and subcontractors make no warrant, express or implied, and assume no legal liability for the information in this report; nor does any party represent that the uses of this information will not infringe upon privately owned rights. This report has not been approved or disapproved by the Energy Commission nor has the Commission passed upon the accuracy or adequacy of the information in this report.

ABSTRACT

Per the requirements in Section 10-103-B(d) of the *2013 Building Energy Efficiency Standards* (2016 Standards) (codified in Title 24, Parts 1 and 6 of the California Code of Regulations), Acceptance Test Technician Certification Providers (ATTCP) must have reported to the California Energy Commission (Energy Commission) what adjustments had been made to the training curricula, if any, to address adopted updates to the Standards. The *2016 Building Energy Efficiency Standards* (2016 Standards) (codified in Title 24, Parts 1 and 6 of the California Code of Regulations) were adopted by the Energy Commission on November 12, 2015 and went into effect on January 1, 2017. Energy Commission staff notified the National Environmental Balancing Bureau (NEBB) on February 12, 2016 that NEBB must develop a report of the adjustments that it will make to its training curricula and application to address the new and modified requirements in the 2016 Standards; this report is referred to in this document as the "2016 Update Report." NEBB submitted its complete 2016 Update Report to the Energy Commission on December 6, 2016.

Staff has evaluated the training curricula adjustments and other application amendments that NEBB submitted in its 2016 Update Report. Staff determined the proposed training updates and other application amendments submitted by NEBB comply with the requirements of Section 10-103.2(c) of the 2016 Standards. Staff recommends approval of NEBB's 2016 training curricula adjustments and other application amendments.

Keywords: Nonresidential Mechanical Acceptance Test Technician Certification Provider, National Environmental Balancing Bureau, Mechanical Systems, Acceptance Testing, Title 24

Please use the following citation for this report:

Brumley, Randy, Joe Loyer. 2017. *Mechanical Acceptance Test Technician Certification Provider 2016 Updates Review: NEBB*. California Energy Commission. Publication Number: CEC-400-2017-012.

TABLE OF CONTENTS

	Page
Abstract	i
Table of Contents.....	ii
List of Tables	ii
Executive Summary.....	3
CHAPTER 1: Background	5
The Acceptance Test Technician Certification Provider (ATTCP) Program	5
Requirements for 2016 Update Report.....	5
Updates to the 2016 Building Energy Efficiency Standards	6
National Environmental Balancing Bureau’s Updates.....	6
CHAPTER 2: Evaluation of ATTCP 2016 Update Report.....	7
Updates to Part 1 of the Building Energy Efficiency Standards.....	7
Updates to Part 6 of the Building Energy Efficiency Standards.....	9
ATTCP Requirements.....	11
Summary of Compliance Method for ATTCP	11
Staff Assessment.....	12
CHAPTER 3: Staff Recommendations.....	16
Glossary	17
APPENDIX A: 2016 Title 24, Part 1 & 6, Excerpts	20

LIST OF TABLES

	Page
Table 1: Summary of ATTCP Compliance with Section 10-103.2(c)3F	9
Table 2: Summary of Compliance to Part 6 Updates.....	13
Table 3: Summary of ATTCP Compliance.....	15

EXECUTIVE SUMMARY

Acceptance testing for mechanical and lighting control systems in nonresidential buildings has been required since the *2005 California Building Energy Efficiency Standards* (Standards). Acceptance testing ensures that installed equipment, controls, and systems in nonresidential buildings operate as required by the Standards. The Acceptance Test Technician Certification Provider (ATTCP) Program (adopted under the 2016 Standards) allows the Energy Commission to approve ATTCPs to provide training, certification, and oversight of acceptance test technicians (ATTs) who perform the acceptance tests required by the Standards, as well as the Acceptance Test Employers (ATEs) that employ ATTs.

Pursuant to Section 10-103-B(d) of the 2013 Standards, ATTCPs were required to report to the California Energy Commission (Energy Commission) what adjustments have been made to the training curricula to address changes to acceptance testing requirements or adopted updates to the Standards no less than six months prior to the effective date of any newly adopted Standards. All reports shall contain a signed certification that the ATTCP has met all requirements for this program. The 2016 training curricula adjustments and any other 2016 application amendments shall be reviewed by the Energy Commission according to the criteria in Section 10-103.2(c)3 of the 2016 Standards, to determine if the ATTCP satisfy the requirements under the 2016 Standards. The 2016 Standards were adopted by the Energy Commission on November 12, 2015 and went into effect on January 1, 2017.

The Energy Commission approved the National Environmental Balancing Bureau (NEBB) to become a Nonresidential Mechanical Acceptance Test Technician Certification Provider on January 13, 2016. Energy Commission staff notified NEBB on February 12, 2016 that it must develop a report of the adjustments that it will make to its training curricula and application to address the new and modified requirements in the 2016 Standards; this report is referred to in this document as the "2016 Update Report." NEBB submitted its 2016 Update Report to the Energy Commission for review on July 6, 2016. Staff determined that this submission did not meet the requirement in the Standards. Staff has been working with NEBB since July to comply with the 2016 Standards. Staff determined that the NEBB 2016 Update Report was complete on December 6, 2016.

Unlike lighting acceptance testing, the industry certification threshold for mechanical systems, defined in Section 10-103.2(b), has not yet been triggered. The industry certification threshold requires two conditions to be met:

1. Certification of greater than 300 mechanical ATTs to perform all acceptance tests as described in Section 120.5.

2. ATTCPs approved by the Energy Commission to, in their entirety, provide reasonable access to certification for technicians across industry groups.

Meanwhile, ATTs are allowed to complete the acceptance test requirements without certification. To date, the approved mechanical ATTCPs have reported a cumulative total of 227 trained technicians. Due to the absence of a certification mandate, mechanical ATTCPs have shared with staff that there is no incentive for contractors to spend the additional cost for training and certification. Moreover, there is an incentive for mechanical ATTs to not be certified and to avoid the threshold. Partly due to this market landscape, ATTCPs like NEBB have been slow to respond with any quality assurance methods that may appear to them to be cost prohibitive.

For this same reason, ATTCPs have found enrollment numbers for certification training to be modest. NEBB has shown difficulty in overcoming some of these short term expenses in its ATTCP program development and as a result frequent delays have been common. Accordingly, the ramifications of these delays are not having a significant impact on stakeholders.

The inability of all approved mechanical ATTCPs to fully comply with the one percent onsite audit requirement, which is new in the 2016 Standards, has delayed approval into 2017. Executive Director's approval to allow ATTCPs to train and certify to the 2016 Standards will help facilitate continued contribution to the totals for surpassing the threshold.

Energy Commission staff has reviewed the NEBB 2016 Update Report and determined that the 2016 training curriculum adjustments and other application amendments submitted by NEBB comply with the requirements of Section 10-103.2(c)3 of the 2016 Standards.

CHAPTER 1: Background

The Acceptance Test Technician Certification Provider (ATTCP) Program

The Acceptance Test Technician Certification Provider (ATTCP) Program allows the Energy Commission to approve ATTCPs to provide training, certification, and oversight of acceptance test technicians (ATTs) who perform the acceptance tests required by California's *Building Energy Efficiency Standards* (Standards) (codified in Title 24, Part 6 of the California Code of Regulations) as well as the Acceptance Test Employers (ATEs) that employ ATTs.

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

Requirements for 2016 Update Report

In accordance with Section 10-103-B(d) of the 2013 Standards, Mechanical ATTCPs were required to report to the Energy Commission what adjustments had been made to the training curricula to address changes to mechanical system acceptance testing requirements or adopted updates to the Standards no less than six months prior to the effective date of any newly adopted Standards. All reports shall have contained a signed certification that the ATTCP had met all requirements for this program.

The Energy Commission adopted the 2016 Standards on November 12, 2015 which went into effect on January 1, 2017. Energy Commission staff notified the National Environmental Balancing Bureau (NEBB) on February 12, 2016 that NEBB must develop a report of the adjustments that it would make to its training curricula and application to address the new and modified requirements in the 2016 Standards; this report is referred to in this document as the "2016 Update Report." NEBB submitted its 2016 Update Report to the Energy Commission for review on July 6, 2016. Staff worked with NEBB over several months to address various issues. Staff determined that NEBB's 2016 Update Report was complete on December 6, 2016.

Energy Commission staff reviewed NEBB's 2016 Update Report according to the review and determination process in Section 10-103.2(f)1 of the 2016 Standards. Although staff's overall review of the 2016 Update Report followed the procedures for the review of an ATTCP application under the 2013 Standards, staff reviewed the individual 2016 Update Report contents for compliance with

the 2016 Standards. Staff evaluates the training curricula adjustments and application amendments contained within an ATTCP's 2016 Update Report to determine if the ATTCP's training and certification services, including quality assurance measures, complies with the criteria and procedures set forth in Section 10-103.2(c)3 of the 2016 Standards.

Updates to the 2016 Building Energy Efficiency Standards

The 2016 Standards include various updates that affect the mechanical system's ATTCP program. Staff considers the majority of these updates to be minor in nature, as these changes do not require the Mechanical ATTCPs to substantively alter their approved applications. The adopted updates to Part 1 and Part 6, which became effective on January 1, 2017, that are most significant to the Mechanical ATTCP program will be discussed in detail as part of staff's evaluation in Chapter 2 of this report.

National Environmental Balancing Bureau's Updates

NEBB, which is a nonprofit trade association, is one of three organizations approved by the Energy Commission as a nonresidential mechanical ATTCP. NEBB was approved on January 13, 2016. NEBB submitted its Update Report to the Energy Commission on July 1, 2016, and in response to feedback from Energy Commission staff, submitted the final component of its 2016 Update Report on December 6, 2016.

Staff completed its evaluation of the 2016 Update Report in accordance with the application review and determination requirement in Section 10-103.2(f)1 of the 2016 Standards. Staff summarized the relevant sections from NEBB's 2016 training curricula adjustments and other application amendments as they pertain to the requirements in Section 10-103.2(c)3 of the 2016 Standards. Furthermore, staff assessed whether NEBB's training curricula adjustments and other application amendments satisfied the ATTCP requirements in Section 10-103.2(c)3 of the 2016 Standards.

CHAPTER 2:

Evaluation of ATTCP 2016

Update Report

To help facilitate the Mechanical ATTCPs' transition to the 2016 Standards, staff identified the most significant changes from 2013 to 2016 for mechanical systems acceptance testing. This chapter has been organized into two main sections according to the changes staff identified and communicated to the ATTCPs. The first section discusses the regulatory changes that staff deemed to have the most impact on ATTCPs at the organizational level: modified quality assurance requirements in Section 10-103.2(c)3F of the 2016 Standards. The second section of this chapter discusses minor updates that ATTCPs must address in the training curricula for certifying and recertifying ATTs and ATEs.

Updates to Part 1 of the Building Energy Efficiency Standards

Regulatory Changes to Quality Assurance

According to Section 10-103.2(c)3F of the 2016 Standards, the ATTCP shall review a random sample of no less than one percent of each ATT's completed compliance forms, and shall perform randomly selected on-site audits of no less than one percent of each ATT's completed acceptance tests.

ATTCP Requirements

ATTCPs are subject to the quality assurance requirement described in 10-103.2(c)3F. This quality assurance requirement requires ATTCPs to review completed acceptance forms and tests for a minimum sample size to ensure consistent compliance. Although staff encourages a larger sample size and frequent auditing, the ATTCPs are required to submit a description of, and findings from, a quality assurance program implementing no less than one percent of each ATT's completed compliance forms, and no less than one percent of each ATT's completed acceptance tests.

Summary of Compliance Method for ATTCP

NEBB will continue to perform a desk audit described in its 2013 Application to comply with the requirement to review a random sample of no less than one percent of each ATT's completed compliance forms following these procedures:

1. The document registry will select a random sample of one percent of all forms submitted by an ATT. This selection will occur every quarter.

2. The document registry will continually check all submitted forms for irregularity or discrepancies in the forms and notify NEBB of anything that may warrant investigation.
3. In addition to the automatic triggers provided above, a desk audit will be performed on one percent of all completed acceptance tests uploaded by each ATT/ATE to the document registry.

If NEBB discovers during an investigation that an ATT/ATE has proof or high probability of incorrect procedures, then the NEBB Title 24 Oversight Committee will take appropriate measures based on the severity of the error. These measures may include mandating additional training and testing, or decertification.

NEBB will append a "shadow audit" requirement to their existing quality assurance procedures to comply with the requirement to perform randomly selected on-site audits of no less than one percent of each ATT's completed acceptance tests adhering to the following procedures:

1. The document registry will select a random sample of one percent of all forms submitted by an ATT. This selection will occur every quarter.
2. NEBB will require each certified ATE to have a "Designated ATT." This individual will be the responsible person of record for that particular ATE and will be responsible for the on-site audit. This individual will visit the project site and watch the other ATT while he or she works.
3. The document registry will track the number of forms submitted by the ATT/ATE and will notify the employer and the Designated ATT that an audit is required once the total number of test forms submitted reaches 100. If an ATT/ATE has not uploaded at least 100 forms by the end of September, an audit notice will be sent to the ATT and ATE.
4. Upon notice of an audit, the designated ATT will schedule an audit on the ATE's next project. The Designated ATT will visit the project and watch the performance of the ATT as he or she performs the work on the required number of forms as indicated by the audit notice.
5. Once the audit is complete, an audit certification signed by the Designated ATT will be sent to NEBB stating the number and type of acceptance tests witnessed.
6. NEBB's Title 24 Program Director and/or Technical Committee will review the completed acceptance tests and audited forms to ensure quality. Irregularities in the forms will trigger an investigation.
7. If NEBB discovers during an investigation that an ATT/ATE has proof or high probability of incorrect procedures, then NEBB will take appropriate measures based on the severity of the error. These measures may include mandating additional training and testing, or decertification and

will be directed at not only the ATE and ATT performing the test but the Designated ATT as well.

Staff Assessment

NEBB mentioned in the ATE training module that the program includes quality assurance, independent oversight, and accountability measures. This section of the employer training continues by identifying that auditors will visit building sites. This stipulation by itself allows for compliance with the Standards; however, it fails to adequately address the changes made to Section 10-103.2(c)3F from the 2013 Standards to the 2016 Standards.

In order to remedy this lack of detail, NEBB provided the necessary specifics in its proposed quality assurance program as a section in their 2016 Annual Report. Most importantly, NEBB described a “shadow audit” process that will work cooperatively with its existing desk audit program.

After reviewing NEBB’s existing quality assurance paper and on-site random audit rates, staff believes that NEBB satisfies the requirements in Section 10-103.2(c)3F of the 2016 Standards and that no further action is required for NEBB to demonstrate compliance with this new requirement. A summary of NEBB’s compliance with the new quality assurance requirements in Section 10-103.2(c)3F of the 2016 Standards may be found in Table 1.

Table 1: Summary of ATTCP Compliance with Section 10-103.2(c)3F

REQUIREMENT	AMENDMENT LOCATION(S)	ADEQUATE
1% random sampling of each ATT’s completed compliance forms	TN214395_20161107T142516_NEBB_ATTCP_Status_Report_2016.pdf, Page 3-4	X
1% randomly selected on-site audits of each ATT’s completed acceptance tests	TN214395_20161107T142516_NEBB_ATTCP_Status_Report_2016.pdf, Page 4-5	X

Source: California Energy Commission Staff.

Updates to Part 6 of the Building Energy Efficiency Standards

Regulatory Changes

The 2016 Standards will include minor updates to Part 6 to provide further clarification and further advocate energy efficiency statewide.

Pursuant to Part 6, Section 110.2, Tables 110.2-A through 110.2-K, space-conditioning equipment shall meet the updated applicable efficiency

requirements. The modified values in the tables will align the 2016 Standards to the national industry standards published by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) in ASHRAE 90.1. This update reflects newer and more efficient technologies available in the marketplace.

Pursuant to Part 6, Section 120.2(i), all newly installed air-cooled packaged direct-expansion units with air handler, mechanical cooling capacity *greater than* 54,000 BTU/hr with an installed air economizer, shall include a stand-alone or integrated Fault Detection and Diagnostics (FDD) system in accordance with Section 120.2(i)1 through Section 120.2(i)8. This update will correct "greater than or equal to" to "greater than" for consistency with ASHRAE 90.1. The impact of the change will allow systems with nominal 54,000 BTU/hr values to be installed without an FDD system.

Pursuant to Part 6, Section 120.2(j), Direct Digital Controls (DDC) to the zone shall be provided as specified by Table 120.2-A. The provided DDC system shall meet the control logic requirements of Section 120.1(c) and Section 120.2(h), and be capable of the following:

1. Monitoring zone and system demand for fan pressure, pump pressure, heating and cooling;
2. Transferring zone and system demand information from zones to air distribution system controllers and from air distribution systems to heating and cooling plant controllers;
3. Automatically detecting the zones and systems that may be excessively driving the reset logic and generate an alarm or other indication to the system operator;
4. Readily allow operator removal of zone(s) from the reset algorithm;
5. For new buildings, trending and graphically displaying input and output points; and
6. Resetting heating and cooling setpoints in all non-critical zones upon receipt of a signal from a centralized contact or software point as described in Section 120.2(h).

Pursuant to Part 6, Section 120.2(k), space conditioning systems with DDC to the zone level shall have optimum start/stop controls. The control algorithm shall, at a minimum, be a function of the difference between space temperature and occupied setpoint, the outdoor air temperature, and the amount of time prior to scheduled occupancy. Mass radiant floor slab systems shall incorporate floor temperature onto the optimum start algorithm. These updates to Part 6, Section 120.2, add specificity regarding the required behavior of Optimum Start/Stop Controls. DDC shall have optimized controls that account for indoor and outdoor air temperature, setpoint, time, and floor temperature (for certain systems),

rather than only requiring that the controls have access to demand information but not necessarily using it in the control logic.

Pursuant to Part 6, Section 140.4(n), any directly conditioned space with operable wall or roof openings to the outdoors shall be provided with interlock controls that disable or reset the temperature setpoint to 55°F for mechanical heating and disable or reset the temperature setpoint to 90°F. Interlocks are not required on doors with automatic closing devices or any space without a thermostatic control (thermostat or a space temperature sensor used to control heating or cooling to the space). This update to the prescriptive requirements for space conditioning systems, adds interlock controls for doors and windows to facilitate the advantages of heating and cooling with natural air. If implemented properly, there is a potential for energy savings.

The functional testing described in the 2013 Nonresidential Reference Appendix 7.5.11.2.4 for Refrigerant Diagnostic Sensors does not move forward into the 2016 Standards. This update clarifies that this testing is not necessary to complete the Nonresidential Mechanical Certificate of Acceptance (NRCA) form for Fault Detection and Diagnostics (FDD) for Packaged Direct Expansion Units (NRCA-MCH-12-A). Moreover, the update remains in compliance with Sections 120.2(i) and 120.5(a)11.

ATTCP Requirements

The 2016 mechanical systems and acceptance testing updates to the Standards detailed above are considered “minor,” because they do not require an ATTCP to substantively alter its approved application. While any changes to the mechanical systems acceptance testing requirements, substantive or not, will require an ATTCP to adjust its training curricula, the minor updates do not require substantive training adjustments—such as entirely new laboratory components or lecture sections. Instead, the minor 2016 updates build upon the requirements in the 2013 Standards. Therefore, the ATTCP must simply demonstrate that its training includes the minor 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 Standards, the ATTCP must demonstrate that its recertification training includes the minor updates. The recertification requirements for minor updates do not include tests or hands-on training, though staff encourages ATTCPs to incorporate those elements where appropriate and possible.

Summary of Compliance Method for ATTCP

NEBB provided an ATE training module and 17 updated training modules for ATTs organized by the acceptance test type (or compliance form name). Each certified ATT and/or ATE will have to attend their respective training(s) to

recertify. The purpose of the training modules is to familiarize ATTs and ATEs with the changes to the 2016 Standards, and in particular, any changes to the Nonresidential Compliance Manual and the mandated mechanical acceptance tests. All ATTs and ATEs will have to complete the respective 2016 Recertification Statement, which serves as a signed affidavit, stating that they have attended the webinar and that their respective qualifications have not changed. If the ATTs and ATEs fail to complete the 2016 Recertification Statement by January 1, 2017 their certification status will change to “decertified” and their name, or in the case of an employer their affiliation, will be removed from the list of certified ATTs or ATEs on NEBB’s website. All of these training materials are confidential; therefore, staff’s evaluation of its compliance is available only in this public document.

The training modules provided by NEBB for the 2016 Standards focus on completion of the Nonresidential Certificates of Acceptance Forms. Local building authorities require these forms as evidence of compliance to the Standards. This approach is suitable, so long as it reflects complete compliance. NEBB presents talking points that reflect the compliance manual, but does not go into specific detail. Since this training will be used for recertification purposes, and the trainees are already familiar with the topic, then it is reasonable to assume that the instructor will provide elaboration where appropriate.

NEBB separates Constant Air Volume and Variable Air Volume into two separate training modules that use the same compliance form. This approach is consistent with NEBB’s 2013 acceptance test training and remains acceptable.

Additionally, NEBB provided prefatory slides at the beginning of each module highlighting the most significant changes to the Standards related to mechanical acceptance testing. This approach allows for an ATT to select any training module and always receive education on the 2016 updates.

Lastly, NEBB provided a training module for employers of ATTs. The ATE training is less complex and provides an overview of the program. The purpose of this training is to educate the ATE on the overall scope of the program and the responsibilities of the ATEs and ATTs.

Staff Assessment

NEBB’s webinars, which are expected to be purchased separately as modules, each provided the updates to Part 6 as prefatory slides to each training module in a concise accurate manner to ATTs and ATEs to help them maintain certification. The first couple of slides identified the changes or clarifications made to the Certificates of Acceptance and indicated the major updates to the 2016 Standards. The updates to the 2016 Standards include the revisions to Tables 110.2-A through 110.2-K, Sections 120.2(a), 120.2(f), 120.2(j), 120.2(k), 120.3(a), and 140.4(n); and Table 140.4-D.

Table 2 below lists the minor changes to Part 6 that relate to ATTCPs, how NEBB addressed each change, and whether Energy Commission staff found the methods to be acceptable.

Staff evaluated NEBB’s submitted certification and recertification confidential materials for the 2016 Standards. Staff determined that NEBB’s 2016 certification training satisfies the requirements in Section 10-103.1(c)3B(i) of the 2016 Standards for ATTs and Section 10-103.2(c)3C of the 2016 Standards for ATEs. Staff has also determined that NEBB’s 2016 recertification training satisfies the requirements in Section 10-103.2(c)3B(vi) of the 2016 Standards for recertification. A summary of NEBB’s compliance with Sections 10-103.2(c)3B(i) and 10-103.2(c)3C of the 2016 Standards, and with Section 10-103.2(c)3B(ii) of the 2016 Standards is found in Table 3.

Table 2: Summary of Compliance to Part 6 Updates

REQUIREMENT	DESCRIPTION	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	2016 T-MCH-XX - 2016-10-26_Added Slides.pdf, Page 1 (For this case, XX indicates the modules MCH-02 through MCH-18)	X
120.2(i)	Corrects “greater than or equal to” to “greater than” for consistency with ASHRAE 90.1	20160701T144235_2016_Employer_Training_Module.pdf: Slide 109	X
120.2(j)	Adds section specifying DDC applications and qualifications	2016 T-MCH-XX - 2016-10-26_Added Slides.pdf, Page 2 (For this case, XX indicates the modules MCH-02 through MCH-18)	X

REQUIREMENT	DESCRIPTION	AMENDMENT LOCATION(S)	ADEQUATE
120.2(k)	Revises the requirements for space conditioning systems with DDC to the zone level	2016 T-MCH-XX - 2016-10-26_Added Slides.pdf, Page 2 (For this case, XX indicates the modules MCH-02 through MCH-18)	X
140.4(n)	Adds control requirements when interlocks for doors and windows are present	2016 T-MCH-XX - 2016-10-26_Added Slides.pdf, Page 1 (For this case, XX indicates the modules MCH-02 through MCH-18)	X
NA7.5.11.2.4	Removes functional testing for Refrigerant Diagnostic Sensors	20160701T145501_2016_T MCH12.pdf, Page 19	X

Source: California Energy Commission Staff.

Table 3: Summary of ATTCP Compliance

REQUIREMENT	DESCRIPTION	AMENDMENT LOCATION(S)	ADEQUATE
10-103.2(c)3B(i)	(Mechanical ATT Training) Curricula	2016701T145450_2016_TMCH02CA V.pdf 2016701T145452_2016_TMCH02VA V.pdf 2016701T145453_2016_TMCH03.pdf 2016701T145454_2016_TMCH05.pdf 2016701T145455_2016_TMCH06.pdf 2016701T145456_2016_TMCH07.pdf 2016701T145457_2016_TMCH08.pdf 2016701T145458_2016_TMCH09.pdf 2016701T145459_2016_TMCH10.pdf 2016701T145500_2016_TMCH11.pdf 2016701T145501_2016_TMCH12.pdf 2016701T145502_2016_TMCH13.pdf 2016701T145503_2016_TMCH14.pdf 2016701T145503_2016_TMCH15.pdf 2016701T145504_2016_TMCH16.pdf 2016701T145505_2016_TMCH17.pdf 2016701T145506_2016_TMCH18.pdf	X
10-103.2(c)3C	Mechanical ATE Training	20160701T144235_2016_Employer_Training_Module.pdf	X
10-103.2(c)3B(vi)	(Mechanical ATT Training) Recertification	20160701T144235_2016_Employer_Training_Module.pdf	X

Source: California Energy Commission Staff.

CHAPTER 3:

Staff Recommendations

Pursuant to the Section 10-103.2(f)1 of the 2016 Standards, staff completed its evaluation of the application amendments NEBB reported in its 2016 Update Report, which staff received in its entirety on December 6, 2016. Staff determined that NEBB's proposed 2016 training curricula adjustments and other application amendments comply with the ATTCP requirements in Section 10-103.2(c)3 of the 2016 Standards. Staff recommends that the Energy Commission approve NEBB's proposed 2016 ATT and ATE training curricula adjustments and 2016 recertification training curriculum.

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.

BTU

British Thermal Unit

A traditional unit of work equal to the amount of work needed to raise the temperature of one pound of water by one degree Fahrenheit.

CAV

Constant Air Volume

A type of heating, ventilating, and air-conditioning (HVAC) system, for which the supply air flow rate is constant, but the supply air temperature varies to meet the thermal loads of a space.

DCV

Demand Control Ventilation

Demand Control ventilation refers to an HVAC system's ability to reduce outdoor air ventilation flow below design values when the space served is less than design occupancy

DDC Digital Direct Controls	DDC refers to automated controls of a condition or process by a digital device (computer). DDC is often used to control the HVAC devices such as valves via microprocessors using software to perform the control logic.
EIN Employer Identification Number	An EIN, also known as a Federal Tax Identification Number, is used to identify a business entity.
FDD Fault Detection and Diagnostics	Automated FDD systems ensure proper HVAC equipment operation by identifying and diagnosing common equipment problems such as temperature sensor faults, low airflow, or faulty economizer operation.
HVAC(R) Heating, Ventilation, and Air Conditioning (and Refrigeration)	A common term used in the heating and cooling industry. It stands for the three (or four) functions often combined into one system in today's modern homes and nonresidential buildings.
IEC International Electro- technical Commission	IEC refers to a nonprofit, non-governmental international standards organization that prepares and publishes International Standards for all electrical, electronic, and related technologies.
ISO International Organization for Standardization	ISO refers to an independent, non-governmental international organization that develops market relevant standards that support innovation and provide solutions to global challenges.
NEBB National Environmental Balancing Bureau	Founded in 1971, NEBB is a nonprofit trade association created to train members in commissioning, ventilating, adjusting, and balancing. The Energy Commission approved NEBB to be a nonresidential mechanical ATTCP on January 13, 2016.

PDF
Portable Document
Format

A file format introduced to ease the sharing of documents between computers and across operating system platforms to save files that cannot be modified but still need to be easily shared and printed.

Standards
Building Energy
Efficiency Standards

State regulations contained in Title 24, Parts 1 and 6 of the California Code of Regulations. California's Building Energy Efficiency Standards are updated on an approximately three year cycle. The Standards focus on key areas to improve energy efficiency of newly constructed buildings and additions and alterations to existing buildings in a cost effective manner.

TES
Thermal Energy
Storage

A commercial HVAC system that reduces energy consumption during peak demand periods by shifting energy consumption to nighttime by creating and storing cooled fluid or ice in tanks.

VAV
Variable Air Volume

VAV refers to a type of HVAC system that varies the airflow at a constant temperature.

APPENDIX A: 2016 TITLE 24, PART 1 & 6, EXCERPTS

Part 1:

Section 10-103.2(c)3A

Requirements for Applicant ATTCPs to Document Training and Certification Procedures. ATTCPs shall include with their application a complete copy of all training and testing procedures, manuals, handbooks and materials. ATTCPs shall explain in writing how their training and certification procedures include, but are not limited to, the following:

Training Scope. The scope of the training shall include both hands-on experience and theoretical training to certify competency in the technologies and skills necessary to perform the acceptance tests.

Section 10-103.2(c)3B(ii)

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

Section 10-103.2(c)3B(v)

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

Section 10-103.2(c)3B(vi)

Recertification. The ATTCP shall recertify all ATTs and ATEs prior to the implementation of each adopted update to the Standards as these updates affect the acceptance test requirements. Recertification requirements and procedures shall only apply to those specific elements that are new or modified in future updates to Standards.

Section 10-103.2(c)F

Quality Assurance and Accountability. The ATTCP shall describe in their application 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 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 2016 Standards, Section 120.5. The ATTCP shall review a random sample of no less than 1 percent of each Technician'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. Independent oversight may be demonstrated by accreditation under the ISO/IEC 17024 standard.

Section 10-103.2(d)2

Update Report: The ATTCP shall have no less than six months following the adoption of an update to the Standards to prepare an Update Report. The ATTCP shall submit an Update Report to the Energy Commission no less than six months prior to the effective date of any newly adopted update to the Standards. The ATTCP shall report to the Energy Commission what adjustments have been made to the training curricula, if any, to address changes to the Standards or to ensure training is reflective of the variety of mechanical systems that are currently encountered in the field. All required update reports shall contain a signed certification that the ATTCP has met all requirements under Section 10-103.2(c). Update reports shall be approved through the Amendment Process provided under Section 10-103.2(f). All required reports shall contain a signed certification that the ATTCP has met all requirements for this program.

Section 10-103.2(e)

Application Review and Determination. The Energy Commission shall review Acceptance Test Technician Certification Provider applications according to the criteria and procedures in Section 10-103.2(c) to determine if such providers meet the specified requirements for providing acceptance testing certification services.

Energy Commission staff will review and validate all information received on Acceptance Test Technician Certification Provider applications, and determine whether the application is complete and contains sufficient information to be evaluated by staff. Complete applications shall be evaluated by staff based on their contents.

The Executive Director may require that the applicant provide additional information as required by staff to fully evaluate the Provider application.

Section 10-103.2(f)

Amendment Process.

The ATTCP may amend a submitted or approved application as described in this Section.

Amendment Scope.

Nonsubstantive Changes. A nonsubstantive change is a change that does not substantively alter the requirements of the application materials for the ATTCP, ATT, or ATT Employer. For amendments making only nonsubstantive changes, the ATTCP shall submit a letter describing the change to the Energy Commission as an addendum to the application.

Substantive Changes. A substantive change is a change that substantively alters the requirements of the application materials for the ATTCP, ATT, or ATT Employer. For amendments making any substantive changes, the ATTCP shall submit the following:

A document describing the scope of the change to the application, the reason for the change and the potential impacts to the ATTCP, ATT, and ATT Employer as an addendum to the application;

A replacement copy of the affected sections of the ATTCP application with the changes incorporated; and

A copy of the affected sections of the ATTCP application showing the changes in underline and strikeout format.

Amendment Review. Amendments submitted prior to approval of an ATTCP application shall be included in the application's Application Review and Determination process specified in Section 10-103.2(e). Amendments submitted after approval of an ATTCP's application that contain only nonsubstantive changes shall be reviewed by the Executive Director for consistency with Section 10-103.2. Amendments determined to be consistent with this Section shall be incorporated into the approval as errata.

Amendments submitted after approval of an ATTCP's application that contain any substantive changes shall be subject to the Application Review and Determination process specified in Section 10-103.2(e). If the Energy Commission finds that the amended application does not meet the requirements of Section 10-103.2, then the ATTCP shall either abide by the terms of their previously approved application or have their approval suspended.

Part 6:

Section 110.2 Tables 110.2-A through 110.2-K

Section 120.2(a)

(a) **Thermostatic Controls for each Zone.** The supply of heating and cooling energy to each space-conditioning or dwelling unit shall be controlled by an individual thermostatic control that responds to temperature within the zone and that meets the applicable requirements of Section 120.2(b). An Energy Management Control System (EMCS) may be installed to comply with the requirements of one or more thermostatic controls if it complies with all applicable requirements for each thermostatic control.

Section 120.2(i)

Economizer Fault Detection and Diagnostics (FDD). All newly installed air-cooled packaged direct-expansion units with an air handler, mechanical cooling capacity greater than 54,000 BTU/hr with an installed air economizer, shall include a standalone or integrated Fault Detection and Diagnostics (FDD) system in accordance with Subsections 120.2(i)1 through 120.2(i)8...

Section 120.2(j)

(j) **Direct Digital Controls (DDC).** Direct Digital Controls to the zone shall be provided as specified by Table 120.2-A. The provided DDC system shall meet the control logic requirements of Sections 120.1(c) and 120.2(h), and be capable of the following:

1. Monitoring zone and system demand for fan pressure, pump pressure, heating and cooling;
2. Transferring zone and system demand information from zones to air distribution system controllers and from air distribution systems to heating and cooling plant controllers;
3. Automatically detecting the zones and systems that may be excessively driving the reset logic and generate an alarm or other indication to the system operator;
4. Readily allow operator removal of zone(s) from the reset algorithm;
5. For new buildings, trending and graphically displaying input and output points; and
6. Resetting heating and cooling setpoints in all non-critical zones upon receipt of a signal from a centralized contact or software point as described in Section 120.2(h).

Section 120.2(k)

(k) **Optimum Start/Stop Controls.** Space conditioning systems with DDC to the zone level shall have optimum start/stop controls. The control algorithm shall, as a minimum, be a function of the difference between space temperature and occupied setpoint, the outdoor air temperature, and the amount of time prior to scheduled occupancy. Mass radiant floor slab systems shall incorporate floor temperature onto the optimum start algorithm.

Table 120.2-A

TABLE 120.2-A DDC APPLICATIONS AND QUALIFICATIONS

BUILDING STATUS	APPLICATIONS	QUALIFICATIONS
Newly Constructed Buildings	Air handling system and all zones served by the system	Individual systems supplying more than three zones and with design heating or cooling capacity of 300 kBtu/h and larger
Newly Constructed Buildings	Chilled water plant and all coils and terminal units served by the system	Individual plants supplying more than three zones and with design cooling capacity of 300 kBtu/h (87.9 kW) and larger
Newly Constructed Buildings	Hot water plant and all coils and terminal units served by the system	Individual plants supplying more than three zones and with design heating capacity of 300 kBtu/h (87.9 kW) and larger
Additions or Alterations	Zone terminal unit such as VAV box	Where existing zones served by the same air handling, chilled water, or hot water systems that have DDC
Additions or Alterations	Air handling system or fan coil	Where existing air handling system(s) and fan coil(s) served by the same chilled or hot water plant have DDC
Additions or Alterations	New air handling system and all new zones served by the system	Individual systems with design heating or cooling capacity of 300 kBtu/h and larger and supplying more than three zones and more than 75 percent of zones are new
Additions or Alterations	New or upgraded chilled water plant	Where all chillers are new and plant design cooling capacity is 300 kBtu/h (87.9 kW) and larger
Additions or Alterations	New or upgraded hot water plant	Where all boilers are new and plant design heating capacity is 300 kBtu/h (87.9 kW) and larger

Section 140.4(n)

(n) **Mechanical System Shut-off.** Any directly conditioned space with operable wall or roof openings to the outdoors shall be provided with interlock controls that disable or reset the temperature setpoint to 55°F for mechanical heating and disable or reset the temperature setpoint to 90°F for mechanical cooling to that space when any such opening is open for more than 5 minutes. EXCEPTION 1 to Section 140.4(n): Interlocks are not required on doors with automatic closing devices. EXCEPTION 2 to Section 140.4(n): Any space without a thermostatic control (thermostat or a space temperature sensor used to control heating or cooling to the space).

Reference Appendix, NA7.5.11.2.4

Deleted