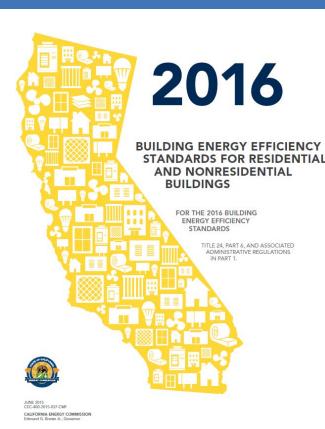
#### DOCKETED

| Docket Number:        | 13-ATTCP-01   |
|-----------------------|---|
| <b>Project Title:</b> | Acceptance and Training Certification   |
| TN #:                 | 213523-2  |
| Document Title:       | California 2016 Building Energy Efficiency Standards for Nonresidential Buildings |
| Description:          | 2016 Updates  |
| Filer:                | Patty Paul  |
| Organization:         | NEMIC   |
| Submitter Role:       | Public  |
| Submission<br>Date:   | 9/8/2016 8:27:00 AM   |
| <b>Docketed Date:</b> | 9/7/2016  |





# CALIFORNIA 2016 BUILDING ENERGY EFFICIENCY STANDARDS FOR NONRESIDENTIAL BUILDINGS

2016 Updates



- The purpose of this webinar is to familiarize yourself with the updates to the 2016 Building Energy Efficiency Standards ("Standards"), and in particular, changes to the Nonresidential Compliance Manual and the mandated mechanical acceptance tests.
- You are required to attend this webinar as part of the recertification requirements as set forth by the Standards Section §10-103.2(c)3B(vi) Recertification as well as by Section 2.3 Renewal of Certification of the NEMIC ATTCP Certification Manual. Failure to do so will result in decertification.



#### Overview

- The most significant efficiency improvements to the nonresidential Standards include alignment with the ASHRAE 90.1 2013 national standards.
- New efficiency requirements for direct digital controls are included in the nonresidential Standards.
- The 2016 Standards also include changes made throughout all of its sections to improve the clarity, consistency, and readability of the regulatory language.



#### Overview

- Changes to Standards Part 1 California Building Standards Administrative Code
- Changes to Standards Part 6 California Energy Code
- Changes to Nonresidential Appendix NA7 Installation and Acceptance Requirements for Nonresidential Buildings and Covered Processes



#### Overview

- The California Code or Regulation Title 24 is organized into separate parts:
  - Part 1 California Building Standards Administrative Code
  - Part 2 California Building Code
  - Part 2.5 California Residential Building Code
  - Part 3 California Electrical Code
  - Part 4 California Mechanical Code
  - Part 5 California Plumbing Code
  - Part 6 California Energy Code



# CHANGES TO STANDARDS PART 1 – California Building Standards Administrative Code



### 10-103.2 – NONRESIDENTIAL MECHANICAL ACCEPTANCE TEST TRAINING AND CERTIFICATION

- (b)1A. No changes with regard to number of (300) Certified Acceptance Test Technicians for the mandates to take effect.
- (c)3B(vi) Recertification. The ATTCP shall recertify all Acceptance Test Technicians and Acceptance Test Employers prior to the implementation of each adopted update to the Building Energy Efficiency 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 Building Energy Efficiency Standards.



### 10-103.2 – NONRESIDENTIAL MECHANICAL ACCEPTANCE TEST TRAINING AND CERTIFICATION

- § 10-103.2(c)3F adds the quality assurance requirement for minimum sample sizing for ATTCP audits.
- § 10-103.2(c)3B(iii) removes the requirement for an ATTCP to describe their review process for determining professional experience.
- §10-103.2(d) adds the distinction between Annual Reports and Update Reports.
- ▶ §10-103.2(e) removes the expired Interim Approval clauses.
- §10-103.2(f) adds the Amendment Process to provide a process for both substantive and non-substantive changes to an ATTCP application without requiring a new application.



## CHANGES TO STANDARDS PART 6 – California Energy Code

© 2016 NEMIC



#### Page 48

#### 2016 Building Energy Efficiency Standards

| TABLE 100.0-A APPLICATION OF STANDARDS         |   |   |                 |                    |                       |  |
|--|---|---|-----------------|--------------------|-----------------------|--|
| Occupancies                                    | Application   | Mandatory   | Prescriptive    | Performance        | Additions/Alterations |  |
| General Provisions fo                          | r All Buildings   | 100.0, 100.1, 100.2, 1  | 10.0            |                    |                       |  |
|  | General   | 120.0   | 140.0, 140.2    |                    |                       |  |
|  | Envelope<br>(conditioned)                                 | 110.6, 110.7,<br>110.8,120.7                                    | 140.3           |                    |                       |  |
|  | Envelope<br>(unconditioned<br>process spaces)             | N.A.  | 140.3(c)        |                    |                       |  |
|  | HVAC<br>(conditioned)                                     | 110.2, 110.5,<br>120.1, 120.2,<br>120.3, 120.4,<br>120.5, 120.8 | 140.4           | 140.0, 140.1<br>14 |                       |  |
| Nonresidential.                                | Water Heating   | 110.3, 120.3,<br>120.8, 120.9                                   | 140.5           |                    | 141.0                 |  |
| High-Rise<br>Residential, And<br>Hotels/Motels | Indoor Lighting<br>(conditioned,<br>process spaces)       | 110.9, 120.8,<br>130.0, 130.1, 130.4                            | 140.3(c), 140.6 |                    |                       |  |
|  | Indoor Lighting<br>(unconditioned and<br>parking garages) | 110.9, 120.8,<br>130.0, 130.1, 130.4                            | 140.3(c), 140.6 |                    |                       |  |
|  | Outdoor Lighting  | 110.9, 130.0,<br>130.2, 130.4                                   | 140.7           |                    |                       |  |
|  | Electrical Power<br>Distribution                          | 110.11, 130.5   | N.A.            |                    |                       |  |
|  | Pool and Spa<br>Systems                                   | 110.4, 110.5,<br>150.0(p)                                       | N. A.           |                    | 141.0                 |  |
|  | Solar Ready<br>Buildings                                  | 110.10  | N.A.            |                    | 141.0(a)              |  |



#### SECTION 110.2 – MANDATORY REQUIREMENTS FOR SPACECONDITIONING EQUIPMENT

[Note: This update brings the minimum efficiency requirements in alignment with ASHRAE 90.1]

**Certification by Manufacturers**. Any space-conditioning equipment listed in this section may be installed only if the manufacturer has certified to the Commission that the equipment complies with all the applicable requirements of this section.

(a) **Efficiency**. Equipment shall meet the applicable efficiency requirements in TABLE 110.2-A through TABLE 110.2-K subject to the following:

- 1. If more than one efficiency standard is listed for any equipment in TABLE 110.2-A through TABLE 110.2-K, the equipment shall meet all the applicable standards that are listed; and
- 2. If more than one test method is listed in TABLE 110.2-A through TABLE 110.2-K, the equipment shall comply with the applicable efficiency standard when tested with each listed test method; and
- 3. Where equipment serves more than one function, it shall comply with the efficiency standards applicable to each function; and
- 4. Where a requirement is for equipment rated at its "maximum rated capacity" or "minimum rated capacity," the capacity shall be as provided for and allowed by the controls, during steady-state operation.



- Table 110.2-a Electrically Operated Unitary Air Conditioners And Condensing Units Minimum Efficiency Requirements
- Table 110.2-b Unitary And Applied Heat Pumps, Minimum Efficiency Requirements
- Table 110.2-c Air-cooled Gas-engine Heat Pumps
- Table 110.2-d Water Chilling Packages Minimum Efficiency Requirements
- Table 110.2-e Packaged Terminal Air Conditioners And Packaged Terminal Heat Pumps Minimum Efficiency Requirements
- Table 110.2-f Heat Transfer Equipment
- Table 110.2-g Performance Requirements For Heat Rejection Equipment
- Table 110.2-h Electrically Operated Variable Refrigerant Flow (Vrf) Air Conditioners Minimum Efficiency Requirements
- Table 110.2-i Electrically Operated Variable Refrigerant Flow Air-to-air And Applied Heat Pumps - Minimum Efficiency Requirements
- Table 110.2-j Warm-air Furnaces And Combination Warm-air Furnaces/Air-conditioning Units, Warm-air Duct Furnaces, And Unit Heaters
- Table 110.2-k Gas- And Oil-fired Boilers, Minimum Efficiency Requirements



## SECTION 120.2 – REQUIRED CONTROLS FOR SPACE-CONDITIONING SYSTEMS

Nonresidential, high-rise residential, and hotel/motel buildings shall comply with the applicable requirements of Sections 120.2(a) through 120.2(k).

- (a) Thermostatic Controls for Each Zone.
- (b) Criteria for Zonal Thermostatic Controls.
- (c) Hotel/Motel Guest Room and High-rise Residential Dwelling Unit Thermostats.
- (d) Heat Pump Controls.
- (e) Shut-off and Reset Controls for Space-conditioning Systems.
- (f) Dampers for Air Supply and Exhaust Equipment.
- (g) Isolation Area Devices.
- (h) Automatic Demand Shed Controls



## SECTION 120.2 – REQUIRED CONTROLS FOR SPACE-CONDITIONING SYSTEMS [continued]

#### (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 stand alone or integrated Fault Detection and Diagnostics (FDD) system in accordance with Subsections 120.2(i)1 through 120.2(i)8.

List of Economizer Fault Detection and Diagnostics Certified to the Energy Commission can be downloaded from <u>http://www.energy.ca.gov/title24/equipment\_cert/fdd/</u>



# SECTION 120.2 – REQUIRED CONTROLS FOR SPACE-CONDITIONING SYSTEMS [continued] (j) Direct Digital Controls (DDC). (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.



## SECTION 140.4 – PRESCRIPTIVE REQUIREMENTS FOR SPACE CONDITIONING SYSTEMS

(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).



# CHANGES TO NONRESIDENTIAL APPENDIX NA7 – Installation And Acceptance Requirements For Nonresidential Buildings And Covered Processes



| New Acce | eptance Test Requirements for 2016 Page 13-1  |   |
|----------|---|---|
| 13.      | Acceptance Test Requirements  |   |
| 13.1     | New Acceptance Test Requirements for 2016   | - |
| A        | Building Envelope, §110.6:  |   |
|          | No changes.   |   |
| B        | Mechanical Acceptance Tests, §120.5:  |   |
|          | <ul> <li>Thermal Energy Storage (TES) Systems (NRCA-MCH-15-A)</li> </ul>  |   |
|          | <ul> <li>Incorporates new acceptance criteria.</li> </ul>   |   |
|          | Minor clarifications:   |   |
|          | <ul> <li>Outdoor Air (NRCA-MCH-02-A)</li> </ul>   |   |
|          | <ul> <li>Supply Water Temperature Reset Controls (NRCA-MCH-09-A)</li> </ul>   |   |
|          | <ul> <li>Hydronic System Variable Flow Controls (NRCA-MCH-10-A)</li> </ul>  |   |
|          | <ul> <li>Fault Detection &amp; Diagnostics for DX Units (NRAC-MCH-12-A)</li> </ul>  |   |
|          | <ul> <li>Automatic Fault Detection &amp; Diagnostic for Air Handling &amp; Zone Terminal<br/>Units (NRCA-MCH-13-A)</li> </ul> |   |
| C        | Lighting Controls Acceptance Tests, §130.4:   |   |
|          | New Acceptance Test   |   |
|          | <ul> <li>Institutional Tuning of Lighting Controls (NRCA-LTI-05-A)</li> </ul>   |   |
|          | Significant Alterations to Acceptance Tests   |   |
|          | <ul> <li>New sampling allowance for acceptance tests.</li> </ul>  |   |
|          | <ul> <li>Changes to the lighting control occupancy sensor maximum time-out period.</li> </ul>                                 |   |
|          | <ul> <li>Changes to the weighted area calculation procedure requirements.</li> </ul>  |   |
|          | Minor clarifications:   |   |
|          | <ul> <li>Outdoor Lighting Acceptance Tests (NRCA-LTO-02-A)</li> </ul>   |   |
| D        | . Covered Process Spaces and Equipment, §120.6:   |   |
|          | New Acceptance Tests  |   |
|          | <ul> <li>Elevator Lighting and Ventilation Controls (NRCA-PRC-12-F)</li> </ul>  |   |
|          | <ul> <li>Escalator and Moving Walkway Speed Control (NRCA-PRC-13-F)</li> </ul>  |   |
|          | Changes to Acceptance Procedures  |   |
|          | <ul> <li>Commercial Kitchen Exhaust (NRCA-PRC-02-A)</li> </ul>  |   |

Parking Garage Exhaust (NRCA-PRC-03-F)

#### © 2016 NEMIC



# NA7.5.1 Outdoor Air: Variable Air and Constant Volume Systems



| OUT        | DO     |  | CALIFORNIA ENER   |                          |
|------------|--------|--|---|--------------------------|
|            |        | ATE OF ACCEPTANCE  |   | NRCA-MCH-02-A            |
| <b>└──</b> |        | Air Acceptance   | •   | (Page 1 of 3)            |
| Project    |        |  | Enforcement Agency:   | Permit Number:           |
|            |        |  |   |                          |
| Project    | Addres | e  | City:   | Zip Code:                |
| System     | Name   | or identification/Tag:   | System Location or Area Served:   |                          |
|            |        |  |   |                          |
|            |        |  | system Enforcement Agency Use: Checked by/Date  |                          |
|            |        | bmit one Certificate of Acceptance for each  | system Enforcement Agency use: Unecked by/Date  |                          |
| that       | mus    | t demonstrate compliance.  |   |                          |
| Inter      | nt:    | Verify measured outside airflow reading is wit<br>units. Reference MECH-3C (Column H or Colum            | hin ± 10% of the total required outside airflow. Required for all n<br>m I) or Mechanical Equipment Schedules.              | ewly installed HVAC      |
|            |        |  |   |                          |
| A. Co      | onsti  | uction Inspection  |   |                          |
| Note       | : MC)  | 1-02-A can be performed in conjunction with M  | CH-07-A Supply Fan VFD Acceptance (if applicable) since testing a   | ictivities overlap.      |
| 1.         | Sup    | porting documentation needed to perform test   | includes:   |                          |
|            | a      |  | e, Mechanical Equipment Schedules, Equipment  |                          |
|            |        | Start-Up Sheets or Balancing Reports).   | Manual data in the second data as a second of the   | and the side of a        |
|            | D.     |  | s Nonresidential Compliance Manual (NA7.5.1.1 Ventilation Syste<br>Volume Systems Outdoor Air Acceptance At-A-Glance).      | ems: Variable Air        |
|            | c.     | 20132016 Building Energy Efficiency Standard   |   |                          |
| 2.         |        | rumentation needed to perform test includes:   |   |                          |
|            |        | Watch  |   |                          |
|            | b.     | Calibrated means to measure airflow (i.e. hot-   | wire anemometer, velocity pressure probe, etc.).  |                          |
|            |        | i. Method and equipment used:  |   |                          |
|            |        | ii. Equipment calibration date (must be wit  | thin one year):   |                          |
| З.         | Syst   | em type (check either VAV or CAV):   | VAV CAV   |                          |
|            | а.     | Check if Variable Air Volume (VAV) and compl   |   |                          |
|            |        | <ul> <li>Outside airflow is either factory calibrate</li> <li>Check if factory calibrated and</li> </ul> | d or field calibrated.<br>d attach calibration certification.   |                          |
|            |        | Check if field calibrated and a  |   |                          |
|            |        | ii. Damper Control (must be checked):  |   |                          |
|            |        |  | ing used to control outside air{This is NOT a fixed minimum po<br>being utilized to control outside air (check method used) | sition).                 |
|            |        | <ul> <li>Outdoor Air CFM Compensati</li> </ul>   |   |                          |
|            |        | Energy Balance Method  |   |                          |
|            |        | Demand Control Ventilation   |   |                          |
|            |        | Return Fan Tracking  |   |                          |
|            |        | <ul> <li>Injection Fan Method</li> <li>Dedicated Minimum Ventilati</li> </ul>                            | on Damper with Pressure Control   |                          |
|            |        | <ul> <li>Other Active Control, Describe</li> </ul>   |   |                          |
|            | b.     | Check if Constant Air Volume (CAV) and verify  | the following:  |                          |
| 4.         |        |  | a fixed minimum OSA when the unit is on.  |                          |
| 4.         | wiet   | hod of delivering outside air to the unit (check of<br>Outside air is ducted to the return air plea      | one of the following):<br>num. Confirm that outside air is ducted to either (check one of th                                | e following):            |
|            |        | <ul> <li>Within five ft. of the unit.</li> </ul>   |   | B/*                      |
|            |        |  | the air directed substantially toward the unit.   |                          |
|            |        |  | te outside air to the unit. (i.e. outside air is ducted directly to the   | e unit or outside air is |
| 5.         |        |  | 1-hour period immediately before the building is normally occu<br>kedl:   | pied to provide (one     |
|            | a.     | The conditioned floor area times the ventilation   | on rate from the 2013 <u>2016</u> Building Energy Efficiency Standards T  | TABLE 120.1-A, or 15     |
|            | b.     | cfm per person times the expected number of  | • •   |                          |
| Ĺ          |        | 3 Complete air changes to the zone se  | rveu by the air handler.  |                          |
| CAB        | uildin | g Energy Efficiency Standards - 20132016 Nonro   | esidential Compliance   | <date></date>            |





|   |  | STATE OF CALIFORNIA<br>OUTDOOR AIR ACCEPTANCE<br>CEC-NRCA-MCH-02-A (Revised MM/YY) | CALIFORNIA ENER                 |                |
|---|--|--|---------------------------------|----------------|
|   | OUTDOOR AIR ACCEPT/<br>CEC-NRCA-MCH-02-A (Revised MM/YY) | CERTIFICATE OF ACCEPTANCE  |                                 | NRCA-MCH-0     |
| ' | CERTIFICATE OF ACCEPTANCE                                | Outdoor Air Acceptance   |                                 | (Page 2 d      |
|   | Outdoor Air Acceptance                                   | Project Name:  | Enforcement Agency:             | Permit Number: |
|   | Project Name:  | Project Address:   | Chy:                            | Zip Code:      |
|   | Project Address:   | System Name or Identification/Tag:   | System Location or Area Served: | L              |

|         |  | B. NA7.5.1.1 Outdoor Air Acceptance Functional Testing   |                     |             |  |  |  |  |
|---------|--|--|---------------------|-------------|--|--|--|--|
| 1       | Submit one Certificate of Ac<br>ust demonstrate complianc                | Step 1: Disable demand control ventilation (if applicable)   |                     |             |  |  |  |  |
| chuc m  | ast demonstrate compliant  | Step 2: Verify unit is not in economizer mode during test (economizer disabled).   |                     |             |  |  |  |  |
| Intent: | Verify measured outside a  | Note: Shaded boxes do not apply for CAV systems  |                     |             |  |  |  |  |
|         | units. Reference MECH-3C   | Step 3: CAV and VAV testing at full supply airflow   |                     |             |  |  |  |  |
| A. Con  | struction Inspection   | Adjust supply air to achieve design airflow or maximum airflow at full<br>a.   |                     |             |  |  |  |  |
| Note: N | ICH-02-A can be performed in   | coolingRecord VFD speed (Hz).<br>b. Measured outdoor airflow reading (cfm)   |                     | Hz          |  |  |  |  |
|         |  | Required outdoor airflow (cfm) (from MCH-03, Column I, or Mechanical   | cfm                 | cfm         |  |  |  |  |
| 1. S    | upporting documentation nee<br>As-built and/or design doc                | c. Equipment Schedules).   | cfm                 | cfm         |  |  |  |  |
| a       | Start-Up Sheets or Balanci   | d. Time for outside air damper to stabilize after full supply airflow is achieved<br>(minutes):  |                     | min         |  |  |  |  |
| D       | <ul> <li>20132016 Building Energy<br/>Systems At-A-Glance and</li> </ul> | Step 4: VAV testing at reduced supply airflow  | CAV                 | VAV         |  |  |  |  |
|         | 20132016 Building Energy   | <ul> <li>Adjust supply airflow to either the sum of the minimum zone airflows, full heating, or 30% of the<br/>total design airflowRecord VFD speed (Hz).</li> </ul> |                     | Hz          |  |  |  |  |
|         | strumentation needed to per  | b. Measured outdoor airflow reading (cfm)  |                     | cfm         |  |  |  |  |
| a.<br>b |  | <ul> <li>c. Required outdoor airflow (cfm) (from MCH-03, Column I, or mechanical equipment schedules).</li> </ul>  |                     | cfm         |  |  |  |  |
|         | i. Method and equipn   | <ul> <li>d. Time for outside air damper to stabilize after reduced supply airflow is achieved (minutes):</li> </ul>  |                     | min         |  |  |  |  |
|         | ii. Equipment calibrati  | Step 5: Return to initial conditions (check)   |                     |             |  |  |  |  |
|         | 3. System type (check either VAV   |  |                     |             |  |  |  |  |
| a       | . Check if Variable Air Volur<br>i. Outside airflow is ei                | C. Testing Calculations & Results  |                     |             |  |  |  |  |
|         | Check if fi  | Determine Percent Outside Air at full supply airflow (%OArA) for Step 3  |                     |             |  |  |  |  |
|         | Check if fi  |  | %                   | %           |  |  |  |  |
|         | ii. Damper Control (mi   | a. %OA <sub>VA</sub> = Measured outdoor airflow reading /Required outdoor airflow (Step <u>3</u> b/Step <u>3</u> c)  |                     |             |  |  |  |  |
|         | iii. One of the following  | <li>b. %OA<sub>IA</sub> is within 10% of design Outside Air. (%OA<sub>IA</sub> ≤ 110%)</li>  | Y / N               | Y / N       |  |  |  |  |
|         | Outdoor  | <ul> <li>Outside air damper position stabilizes within 5 minutes (Step <u>3</u>d &lt; 5 minutes)</li> </ul>  |                     | Y / N       |  |  |  |  |
|         | Energy Ba  | Determine Percent Outside Air at reduced supply airflow (%OA <sub>RA</sub> ) for Step <u>4</u> (VAV only)  |                     |             |  |  |  |  |
|         | Demand (<br>Return Fa  | a. %OA <sub>RA</sub> = Measured outdoor airflow reading /Required outdoor airflow reading (Step <u>4</u> b/Step <u>4</u> c)  |                     | %           |  |  |  |  |
|         |  | <li>b. %OA<sub>NA</sub> is within 10% of design Outside Air. (OA<sub>NA</sub> ≤ 110%)</li>   |                     | Y / N       |  |  |  |  |
|         | Dedicated  | c. Outside air damper position stabilizes within 5 minutes (Step <u>4</u> d < 5 minutes)   |                     | Y / N       |  |  |  |  |
| ь       | <ul> <li>Other Act</li> <li>Check if Constant Air Volu</li> </ul>        | Note: The intent of this test is to ensure that 1) all air handlers provide the minimum amount of OSA and<br>controls to avoid over ventilation.                     | 2) VAV air handlers | use dynamic |  |  |  |  |
|         | System is  |  |                     |             |  |  |  |  |
| 4. N    | 1ethod of delivering outside ai  | D. Evaluation  |                     |             |  |  |  |  |
|         | Outside air is ducted     Within fr                                      |  |                     |             |  |  |  |  |
|         | Within 1   | PASS: All Construction Inspection responses are complete and Testing Calculations & Results respon<br>(Y - yes)  | nses are positive   |             |  |  |  |  |
| 1       |  |  |                     |             |  |  |  |  |

Return air plenum is I provided independen

cfm per person times the

5. Pre-occupancy purge has been of the following methods must a. The conditioned floor area

b.

Project Address: System Name or Identification/Tag:

3 <u>C</u>omplete air ch CA Building Energy Efficiency Standar

© 2016 NEMIC

CA Building Energy Efficiency Standards - 20132016 Nonresidential Compliance

<Date>

NRCA-MCH-02-A

(Page 2 of 3) Permit Number:



| The C Outroom Mark COEPTING UTDOOR AND ACCEPTING UTDOOR AND ACCEPTIN               |                                      |  | STATE OF CALIFORNIA<br>OUTDOOR AIR ACCEPTANCE       |                     |   |                                    |
|--|--------------------------------------|--|---|---------------------|---|------------------------------------|
| INITE DOCINAL       Image: Control Cont Control Cont Control Control Control Cont Control Cont   |                                      |  |   |                     | C/  |                                    |
|  |                                      | CEC-NRCA-MCH-02-A (Revised MM/YY)                    |   | · · ·               |   |                                    |
| Definition of a Screptions         mainteent         Mainteen  |                                      |  | -   | Enforcement Agen    | ch:   |                                    |
| Under Arr Arcorptions         Impaired and the control of the co   |                                      |  | Broke B B Black                                     |                     | -   | an de de                           |
| Teachard    Teachard   Teachard   Teachard   Teachard   Teachard   Teachard   Teachard   Teachard   Teachard   Teachard   Teachard   Teachard   Teachard   Teachard   Teachard   Teachard   Teachard   |                                      |  | Project Address:                                    | city:               |   | zip code:                          |
| Test Submittantian production       Descriptions of Acceptance decommentation is accurate and complete.         Test Submittantian production is accurate and complete.       Submittantian production is accurate and complete.         Test Submittantian production is accurate and complete.       Submittantian production is accurate and complete.         Test Submittantian production is accurate and complete.       Submittantian production is accurate and complete.         Submittantian production is accurate and complete.       Submittantian production is accurate and complete.         Submittantian production is accurate and complete.       Submittantian production is accurate and complete.         Submittantian production is accurate and complete.       Submittantian production is accurate and complete.         Submittantian production is accurate and complete.       Submittantian production is accurate and complete.         Submittantian production is accurate and complete.       Submittantian production is accurate and complete.         Submittantian production is accurate and complete.       Submittantian production is accurate and complete.         Submittantian production is accurate and complete.       Submittantian production is accurate and complete.         Submittantian production is accurate and complete.       Submittantian production is accurate and complete.         Submittantian production is accurate and complete.       Submittantian production is accurate and complete.         Submittantian productin production is acc   |                                      | Project Address:                                     | System Name or Identification/Tag:                  | System Location or  | Area Served:                                  | •                                  |
| Note: Submit one Certificate /A<br>function market model completes       In CHY Internation Address Address and CHY Internation Address and CHY Internation Address and Completes         Note: Submit one Certificate /A<br>function market model completes       In CHY Internation Address Add  | Project Address:                     | System Name or Identification/Tag:                   |   |                     |   |                                    |
| Note:         Note:         Description:           Intermediation:         Intermediation:         Intermediation:         Description:           Intermediation:         Intermediation:         Description:         Description:           Intermediation:         Intermediation:         Description:         Description:           Intermediation:         Description:         Description:         Description:         Description:           Intermediation:         Description:         Descrintescri  | System Name or Identification/Tag:   |  | DOCUMENTATION AUTHOR'S DECLARATION STATEME          | ENT                 |   |                                    |
| Note::Source out criticate of Acceptance complex       Bar 1: Barle dermand control werden complex       Barl 1: Barle dermand control werden complex         Inter::::::::::::::::::::::::::::::::::::  |                                      | P. NA7 E 1 1 Outdoor Air Accontance E                |   | entation is accura  |   |                                    |
| Instrumental and/or demonstrate company lane.         Instrumental and/or demonstrate company lane.         Instrumental and/or demonstrate company lane.           Instrumental and/or demonstrate company lane.         Instrumental and/or demonstrate company lane.         Instrumental and/or demonstrate company lane.         Instrumental and/or demonstrate company lane.           A. Construction hypertial         Instrumental and/or demonstrate company lane.         Instrumental and/or demonstrate company lane.         Instrumental and/or demonstrate company lane.           A. Construction hypertial and company lane.         Instrumental and/or demonstrate company lane.         Instrumental and/or demonstrate company lane.         Instrumental and/or demonstrate company lane.           A. Construction in the spectrate complex with the sp   | Note: Submit one Certificate of A    |  | Documentation Author Name:                          |                     | Documentation Author Signature:               |                                    |
| Internet         wordy measured analysis         Processes         Processes         Processes           A. Construction Insegration         Sep 3: CAX and VAX basing a KM supply for CAV program         Processes         Processes <td>that must demonstrate complian</td> <td></td> <td>Documentation Author Company Name:</td> <td></td> <td>Date Signed:</td> <td></td>   | that must demonstrate complian       |  | Documentation Author Company Name:                  |                     | Date Signed:                                  |                                    |
| Intermeter         Intermeter         Construction regreter         Proce           A. Construction regreter         3. Supporting documentation regime to realize in formation realized in the parameter of the state of california:         Image: California: <td>Marify manufactured autoiday</td> <td></td> <td>Address:</td> <td></td> <td>ATT Certification Identification (If applicat</td> <td>ie):</td>   | Marify manufactured autoiday         |  | Address:  |                     | ATT Certification Identification (If applicat | ie):                               |
| A. Construction inspection       Index Activity rays for the status design in a conjug. Second and the specification is configured on this certificate of acceptance is true and correct.         1. Supporting documentation in a conjug. Second and the specification and th   |                                      |  | Chulthata/Xer                                       |                     | Dhone:  |                                    |
| PLID TECHNICIAN DECLARITION STATEMENT     PLID TECHNICIAN SECOND SE                |                                      |  | Gry/state/ap.                                       |                     | ritore.                                       |                                    |
| Note: MACH 20-A can be profound in       b.       Measured audoor arithow (red)       I certify the following under penalty of periods on this certificate of Acceptance (red) area (red)         1.       Supporting documentation area       Beguined subdoor arithow (red)       I information provided on this Certificate of Acceptance complex with the applicable acceptance requirements indicated in the plane and specifications approved by the enforcement agency, and conforms to the applicable acceptance requirements indicated in the plane and specifications for the construction or installation identified on this Certificate of Acceptance (red) (red) (rm)         2.       Instruments and procedures specified in Reference complex with the applicable acceptance requirements indicated in the plane and specifications proved by the enforcement agency, and conforms to the applicable acceptance intro addition (red) (rm) (rm)         2.       Instruments and procedures specified in Reference conversion with applicable acceptance intro addition (red) (rm) (rm)         3.       Explorements and procedures specified in Reference tormal deviation (red) (rm) (rm)         4.       Method and equip         5.       Deteo (red) (rm)         6.       Beasured audoor arithow (rm)         6.       Deteo (red) (rm) <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td></td<>  |                                      |  |   |                     |   |                                    |
| Supporting documentation end     a A-built and/or design do     a A-strature regulated addoor airflow (cm) (cm)     cuplement document     b. collarized means to mean     b. collarized means     cuplement     b. collarized means     cuplement     b. collarized means     cuplement                     | Note: MCH-02-A can be performed in   |  |   |                     |   |                                    |
| A-built and/or design de<br>A-built and/or design de<br>A  | 1. Supporting documentation nee      |  |   |                     |   | e (Field Technician).              |
| <ul> <li>analyse analyse anal</li></ul>  |                                      | Time for outside air damper to stabiliz              |   |                     |   |                                    |
| System XA-4 discover and seven posted or make available with the building.  A distribute the test total design affrow. Accord VFD spece or make available with the building.  A distribute meaning to the construction or installation identified on this Certificate of Acceptance has been posted or make available with the building.  A distribute meaning to the construction or installation identified on this Certificate of Acceptance has been posted or make available with the building.  A distribute meaning to the construction or installation identified on this Certificate of Acceptance has been posted or make available with the building.  A distribute meaning to the construction or installation identified on this Certificate of Acceptance has been posted or make available with the building.  A distribute meaning to the construction is provided in the posted or make available with the building.  A distribute meaning to the construction is provided in the posted or make available with the building.  A distribute meaning to the construction is provided in the certificate of Acceptance and attest to the feal technication is acting on my behalf as my employee or my agent and have reviewed the information provided on this Certificate of Acceptance and attest to the declarations in this Statement (responsible acceptance preson).  A technol of delivering outside air damper position stabilizes information provided on this Certificate of Acceptance and attest to the declarations in this Statement (responsible acceptance preson).  A technol of delivering outside air damper position stabilizes information provided on this Certificate of Acceptance and attest to the declarations in this Statement (responsible acceptance preson).  A technol of delivering outside air damper position stabilizes in the isoftent of the series to the score technol or installation identified on this Certificate of Acceptance and attest to the declarations in this statement (responsible acceptance preson instit).  A technol of delivering outside is a d            | Start-Up Sheets or Balanc            |  |   |                     |   | pplicable acceptance               |
| <ul> <li>c. 2442_2018 building for Enrorg</li> <li>a. Majust supply almol to either the sum total design afforw. accord VTO specificate of acceptance and set of the solution is sumed on the building.</li> <li>b. Calibrated means to make a valiable with the building memot(s)</li> <li>c. Bareard outdoor airflow reading (cf)</li> <li>c. Bequired outdoor airflow (cm) (f/form i</li> <li>d. Time for outside air damper to stabiliz</li> <li>System type (check etter VU)</li> <li>a. Check if Variable in Contention is Acceptance and attest to the solution is antification (fragulation)</li> <li>c. Check if Variable in Contention is A solution in the solution is antification in the composition is antification in the composition in the com</li></ul> |                                      | Step 4: VAV testing at reduced supply airflo         |   |                     |   | this Certificate of Acceptance has |
| Industry of the biology of the                 | c. 20132016 Building Energy          |  |   |                     |   |                                    |
| <ul> <li>a. Mathod and equip</li> <li>b. calibrated means to mean</li> <li>i. Method and equip</li> <li>i. Equipment calibrate</li> <li>i. System type (check either VAV</li> <li>a. South and the control of the contr</li></ul>  |                                      |  |   |                     | Field Technician Construer                    |                                    |
| i. Method and equip   ii. Equipment calibra   ii. System type (check either V   s. Check if Variable Air Void   ii. Outside air damper to stabiliz   s. Check if Variable Air Void   ii. Outside air damper to dutide air at full supply   ii. Outside air damper position stabilizes   iii. One of the followine   iiii. One of the followine   iiii. One of the followine   iiii. One of the followine   iiiiii. One of the followine   iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii   |                                      |  |   |                     | -   |                                    |
| ii.       Equipment calibrat         3.       System type (lock kither Vax)         a.       Check kither Vaxio         b.       Casting allow in the processing of the procesing of the processing of the processing of the proces  |                                      |  | Field Technician Company Name:                      |                     | Position with Company (Title):                |                                    |
| 3. System type (heck either VAY as a. Check either VAY as a. Check either VAY as a. Check either VAY as a check either VAY as a. Outside air dual support of the set of the s              | ii. Equipment calibrat               |  | Address:  |                     | ATT Certification Identification (if applicat | xie):                              |
| i. Outside airfow is e   C. Testing Calculations & Results   Determine Percent Outside Air 1 full supply   ii. Determine Percent Outside Air 1 full supply   iii. Determine Percent Outside Air 1 reduced su   Determine Perc  |                                      | Step 5. Retain to initial conditions (circle)        | City/State/Zip:                                     |                     | Phone:  | Date Signed:                       |
| Check iff     Determine Percent Outside air at full supply     ii. Damper Control [m         Dynamic     iii. One of the following under the strip the following under Division 3 of the Business and Professions Code in the applicable classification to accept responsibility for the     system design, Construction or installation of features, materials, components, or manufactured devices for the scope of work     identified on this Certificate of Acceptance and attracts to the declarations in this statement (responsible acceptance person).     Certificate of Acceptance and attracts to the applicable classification to accept responsibility for the     system design, Construction or installation of features, materials, components, or manufactured devices for the scope of work     identified on this Certificate of Acceptance and attracts to the declarations in this statement (responsible acceptance person).     The information provided on this Certificate of Acceptance and states that the construction or installation identified on this     Certificate of Acceptance and states to the applicable acceptance requirements indicated in the plans and specifications approved by the     enforcement agency, and conforms to the applicable acceptance requirements and procedures specified in Reference Nonresidential     Appendix NA7.     Method of deliving outside ar is durited     within 1     PASS. All Construction Inspection resp     responsible Acceptance Person Syntare:     Return air plenum is     provided independer     S. Pre-occupancy pure has been     of the following methods must     a. The conditioned floor are     cm per person times the     b. a geomplete air chose and     counties are inclused in the publicing permit(s) issued for the building     permit(s) issued for the building permit(s) issued for the building     method with Company (Tite):     Responsible Acceptance Person Company Name:     Responsible Acceptance Person Syntare:     Responsible Acceptance Person Company Name:     Responsible Acceptance                 |                                      | C Testing Calculations & Results                     |   |                     |   |                                    |
| <ul> <li>Check if Constant Air Vota</li> <li>Mothod of delivering outside air damper position stabilizes</li> <li>Constant Air Vota</li> <li>PASS: All Construction Inspection resp</li> <li>(Y-yes)</li> <li>Passe and constant Air Vota</li> <li>Pass</li></ul>   | Check if 1                           |  |   | the lowe of the Sta | to of California:                             |                                    |
| <ul> <li>b. %OA<sub>14</sub> is within 10% of design Outside</li> <li>C. Outside air damper position stabilizes</li> <li>Determine Percent Outside Air at reduced su</li> <li>a. %OA<sub>14</sub> = Measured outdoor airflow re</li> <li>b. %OA<sub>14</sub> = Measured outdoor airflow re</li> <li>b. %OA<sub>14</sub> = Measured outdoor airflow re</li> <li>c. Outside air damper position stabilizes</li> <li>d. Method of delivering outside a</li> <li>Outside air is ducted</li> <li>within 1</li> <li>PASS: All Construction Inspection Inspection resp</li> <li>(Y- yes)</li> <li>The eccupancy purge has been of the Following</li> <li>Personcipe A corptance Person Signature:</li> <li>Responsible Acceptance Person Signature:</li> <li>Chy/State/Zip:</li> <li>Phone:</li> <li>Dete Signed:</li> </ul>  |                                      |  |   |                     |   | and I have reviewed the            |
| <ul> <li>C. Outside air damper position stabilizes</li> <li>Determine Percent Outside Air at reduced su</li> <li>Determine Percent Outside Air at reduced su</li> <li>A %OAA, is within 10% of design Outside</li> <li>a, %OAA, is within 10% of design Outside</li> <li>C. Outside air damper position stabilizes</li> <li>A. Check if Constant Air Vol.</li> <li>System design, construction or installation of the acceptance substantiates that the construction or installation identified on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance available with the building.</li> <li>I will ensure that a completed and its portion substantificate of Acceptance available to the enforc</li></ul>                                     | Dynamic                              |  | information provided on this Certificate of Accepta | tance.              |   |                                    |
| <ul> <li>Energy B         <ul> <li>Determine Percent Outside Air at reduced su                 <ul> <li>Bernard</li></ul></li></ul></li></ul>  |                                      |  |   |                     |   |                                    |
| <ul> <li>Return F, Othek = Measured outdoor airnow reining to the segment of the following methods must a. The conditioned floor are cfm per person times the b. 3 Complete air charge are are are cfm per person times the b. 3 Complete air charge are are are are are are are are are ar</li></ul>  |                                      | Determine Percent Outside Air at reduced su          |   |                     |   |                                    |
| <ul> <li>Injection</li> <li>Injection</li></ul>   |                                      | a. %OA <sub>RA</sub> = Measured outdoor airflow rei  |   |                     |   |                                    |
| C       Outside air damper position stabilizes         Appendix NA7.         b. Check if constant Air Volu         System is         4. Method of delivering outside a         Outside air is ducted         Within f         Within f         Within f         Within f         PASS: All Construction Inspection resp         Y(Y yes)         Pass: All Construction Inspection resp         Y(Y) yes)         Pre-occupancy purge has been of the following methods must         a. The conditioned floor are cfm per person times the b.         b. 3       Complete air ch   |                                      | b. %OA <sub>RA</sub> is within 10% of design Outside |   |                     |   |                                    |
| <ul> <li>b. Check if Constant Air Vol<br/>System is</li> <li>4. Method of delivering outside air is ducted<br/>Outside air is ducted<br/>Within fi<br/>Within 1</li> <li>5. Pre-occupancy purge has been<br/>of the following methods must</li> <li>a. The conditioned floor are<br/>cfm per person times the<br/>b. 3 <u>C</u>omplete air ch</li> </ul>   | Dedicate                             | c. Outside air damper position stabilizes            |   |                     | iquitements and procedures speen              |                                    |
| System is     Controls to avoid over ventilation.     System is     Outside air is ducted     Outside air is ducted and is posted of the ductage and available with the building, and made available with the ductage and available with the ductage and available air is ducted, signed copy of this Certificate of Acceptance serves signed copy of this Certificate of Acceptance Person Signeture:     Responsible Acceptance Person Signeture:     Responsible Acceptanc                |                                      |  |   |                     |   | this Certificate of Acceptance has |
| Method of delivering outside a irs ducted     Outside a irs ducted     Within f     Within 1     Within 1     PASS: All Construction Inspection resp     provided independer     S. Pre-occupancy unge has been     of the following methods must     a. The conditioned floor are     cfm per person times the     b. 3 Complete air ch   |                                      | controls to avoid over ventilation.                  |   |                     |   | available with the building        |
| Within fi       PASS: All Construction Inspection resp       signed copy of this Certificate of Acceptance is required to be included with the documentation the builder provides to the building owner at occupancy.         Return air plenum is provided independer       Return air plenum is provided independer       Responsible Acceptance Person Name:       Responsible Acceptance Person Signature:         S. Pre-occupancy purge has been of the following methods must       Address:       CSLB License:         a. The conditioned floor are cfm per person times the b.       3       Complete air ch   |                                      | D. Contraction                                       |   |                     |   |                                    |
| Within 1     PASS: All Construction Inspection resp<br>(Y - yes)     Owner at Occupancy.       Return air plenum is<br>provided independer     Responsible Acceptance Person Name:     Responsible Acceptance Person Signature:       5.     Pre-occupancy purge has been<br>of the following methods must     Responsible Acceptance Person Company Name:     Position with Company (Title):       a.     The conditioned floor are<br>cfm per person times the<br>b.     3     Complete air ch   |                                      |  |   | quired to be inclu  | ded with the documentation the bu             | uilder provides to the building    |
| Return air plenum is provided independer       Responsible Acceptance Person Company Name:       Position with Company (Title):         S. Pre-occupancy purge has been of the following methods must       Address:       CSLB License:         a. The conditioned floor are cfm per person times the b. 3 Complete air ch       City/State/Zip:       Phone:       Date Signed:  |                                      |  |   |                     | Responsible Acceptance Person Signature       | :                                  |
| provided independer     Pre-occupancy purge has been<br>of the following methods must     Pre-occupancy purge has been<br>of the following methods must     CSLB License:       a. The conditioned floor are<br>cfm per person times the<br>b. 3 Complete air ch     City/State/Zip:     Phone:     Date Signed:   | Return air plenum is                 |  |   |                     |   |                                    |
| of the following methods must     City/State/Zip:     Phone:     Date Signed:       a. The conditioned floor are<br>cfm per person times the     City/State/Zip:     Phone:     Date Signed:       b. 3 Complete air ch     City/State/Zip:     City/State/Zip:     City/State/Zip:  | provided independer                  |  |   |                     |   |                                    |
| a. The conditioned floor are<br>cfm per person times the<br>b. 3 Complete air ch   |                                      |  | Address:  |                     | CSLB License:                                 |                                    |
| cfm per person times the<br>b. 3 <u>c</u> omplete air ch   |                                      |  | City/State/Zip:                                     |                     | Phone:  | Date Signed:                       |
|  |                                      |  | L   |                     | l   | l                                  |
|  | b. 3 <u>C</u> omplete air ch         |  |   |                     |   |                                    |
|  | CA Building Energy Efficiency Standa |  |   |                     |   |                                    |

CA Building Energy Efficiency Standards - 20132016 Nonresidential Compliance

CA Building Energy Efficiency Standards - 201



|   | STATE OF CALIFORNIA  | CERTIFICATE OF ACCEPTANCE- USER INSTRUCTIONS NRCA-MCH-02-A  |
|---|--|---|
| ALIFORNIA   | OUTDOOR AIR ACCEPTAN<br>CEC-NRCA-MCH-02-A (Revised MM/YY)  | Outdoor Air Acceptance (Page 1 of 1)  |
| OR AIR ACCEPTANCE   | CERTIFICATE OF ACCEPTANCE  | NRCA-MCH-02-A User Instructions   |
| MCH-02-A (Revised MM/YY)<br>ATE OF ACCEPTANCE                                 | Outdoor Air Acceptance   | NRCA-WCH-02-A Oser Instructions   |
| Air Acceptance  | Project Name:  | This form is used to document results of the minimum outdoor air ventilation tests for both constant and variable air volume fan  |
|   | Project Address:   | systems. A separate form should be completed for each system tested. The form is separated into several basic sections:   |
| s:  | System Name or Identification/Tag:   | construction inspection; functional testing; testing calculations and results; and pass/fail evaluation. Each section consists of a   |
| or Identification/Tag:  |  | combination of data entry requirements and check boxes.   |
|   | DOCUMENTATION AUTHOR'S DECLARAT  |   |
|   | 1. I certify that this Certificate of Accep  | Section A. Construction Inspection  |
| 1.1 Outdoor Air Acceptance Fun  | Documentation Author Name:   | This pre-test section consists of check boxes and data entry requirements for both constant and variable air  |
| sable demand control ventilation (if  | Documentation Author Company Name:   | volume systems. Complete only the check boxes associated with the appropriate system type.  |
| rify unit is not in economizer mode   | Address:   |   |
| ded boxes do not apply for CAV syster   |  | Section B. NA7.5.1.1 Outdoor Air Acceptance - Functional Testing  |
| V and VAV testing at full supply airfl  | City/State/Zip:  | This section consists of check boxes and data entry requirements for both constant and variable air volume  |
| ust supply air to achieve design airflo<br>lingRecord VFD speed (Hz).         | FIELD TECHNICIAN'S DECLARATION STAT  | systems. Enter data associated with the appropriate system type as instructed.  |
| asured outdoor airflow reading (cfm)  | I certify the following under penalty of pe  | Section C. Testing Calculations and Results   |
| uired outdoor airflow (cfm) (from MC  | <ol> <li>The information provided on this Cell</li> <li>I am the person who performed the</li> </ol> | <u>Section C. Testing Calculations and Results</u><br>This section consists of data entry requirements for both constant and variable air volume systems. Enter data  |
| <i>ipment Schedules).</i><br>Ie for outside air damper to stabilize a         | 3. The construction or installation iden   | associated with the appropriate system type as instructed.  |
| nutes):   | indicated in the plans and specificati<br>requirements and procedures specifi                        |   |
| W testing at reduced supply airflow   | 4. I have confirmed that the Certificate   | Section D. Evaluation   |
| ust supply airflow to either the sum o<br>al design airflowRecord VFD speed ( | been completed and signed by the re  | This section contains check boxes to indicate the pass/fail results of the test(s). Check the appropriate box. An   |
| asured outdoor airflow reading (cfm)  | issued for the building.<br>Field Technician Name:   | portion that fails should be explained in the given rows.   |
| uired outdoor airflow (cfm) (from MC  |  |   |
| e for outside air damper to stabilize a                                       | Field Technician Company Name:   | Declaration Statements  |
| turn to initial conditions (check)  | Address:   | This section contains fillable fields for three declaration statements: one from the Documentation Author, one<br>from the Field Technician, and one from the Responsible Person. Each area contains a combination of check       |
|   | City/State/Zip:  | boxes and data entry requirements, including signature; date; and license number. Complete check boxes and  |
| g Calculations & Results  | RESPONSIBLE PERSON'S DECLARATION S   | enter data as instructed.   |
| e Percent Outside Air at full supply air                                      | I certify the following under penalty of pe  |   |
| ArA = Measured outdoor airflow read   | 1. I am the Field Technician, or the Field   | The Documentation Author is the person completing the form. The Field Technician is responsible for   |
| A <sub>FA</sub> is within 10% of design Outside Ai                            | information provided on this Certific<br>2. I am eligible under Division 3 of the I                  | performing and documenting the results of the acceptance procedures on the Certificate of Acceptance forms  |
| side air damper position stabilizes wi  | system design, construction or instal  | The Field Technician must sign the Certificate of Acceptance to certify that the information he or she provides<br>on the Certificate of Acceptance is true and correct. It is important to note that the Field Technician is not |
| e Percent Outside Air at reduced supp   | identified on this Certificate of Acces  | required to have a contractor's, architect's or engineer's license. A Responsible Person is eligible under Divisio  |
| A <sub>RA</sub> = Measured outdoor airflow read                               | <ol> <li>The information provided on this Certificate of Acceptance complies w</li> </ol>            | 3 of the Business and Professions code in the applicable classification to take responsibility for the scope of   |
| A <sub>RA</sub> is within 10% of design Outside A                             | enforcement agency, and conforms t   | work specified by the Certificate of Acceptance document. The Responsible Person can also perform the field   |
| side air damper position stabilizes wi  | Appendix NA7.<br>4. I have confirmed that the Certificate  | testing and verification work, and if this is the case the Responsible Person must complete and sign both the   |
| intent of this test is to ensure that 1)<br>o avoid over ventilation.         | <ol> <li>I have commed that the certificate<br/>been completed and is posted or ma</li> </ol>        | Field Technician's signature block and the Responsible Person's signature block on the Certificate of<br>Acceptance form. The Responsible Person assumes responsibility for the acceptance testing work performed.                |
|   | 5. I will ensure that a completed, signed  | the Field Technician agent or employee.   |
| ation   | permit(s) issued for the building, and<br>signed copy of this Certificate of Acc                     |   |
| S: All Construction Inspection respon   | owner at occupancy.  |   |
| yes)  | Responsible Acceptance Person Name:  |   |
|   | Responsible Acceptance Person Company Name:  |   |
|   | Address:   |   |
|   | City/State/Zip:  |   |
|   |  |   |
|   |  |   |
|   |  |   |
|   |  |   |
| g Energy Efficiency Standards - 2013  | CA Building Energy Efficiency Standards -  |   |
|   | and senantly creeky condency standards   |   |
|   |  | CA Building Energy Efficiency Standards - 20132016 Nonresidential Compliance  |
| g Energy Effi   | ciency Standards - <del>2013</del>   | ciency Standards - 2013:<br>CA Building Energy Efficiency Standards   |



# NA7.5.4 Air Economizer Controls Acceptance



|              | CON       | ORNIA<br>IOMIZER CONTROLS ACCEPTAN<br>05-A (Revised <u>MWYY</u> )   | CE              | CALIFO   |                                   |
|--------------|-----------|---|-----------------|--|-----------------------------------|
| CERTIFI      | CATE      | OF ACCEPTANCE   |                 |  | NRCA-MCH-05-A                     |
| Air Econ     | nomiz     | er Controls Acceptance  |                 |  | (Page 1 of 3)                     |
| Project Name | e:        |   | Enforc          | sement Agency:   | Permit Number:                    |
| Project Addr | ess:      |   | City:           |  | Zip Code:                         |
|              |           | tification/Tag:   |                 | n Location or Area Served:   |                                   |
| System Name  | e or iden | ufication/Tag:  | System          | n Location of Area Served:   |                                   |
|              |           | one Certificate of Acceptance for each system that m<br>ompliance.  | ust             | Enforcement Agency Use: Checked b  | y/Date                            |
| A. Cons      | tructi    | ion Inspection  |                 |  |                                   |
| 1. Su        | pporti    | ing documentation needed to perform test includes   | :               |  |                                   |
| a.           |           | 132016 Building Energy Efficiency Standards Nonres<br>Slance).  | identi          | ial Compliance Manual (NA7.5.4 Air Eco   | onomizer Controls Acceptance At-  |
| b.           | - 20      | Building Energy Efficiency Standards.   |                 |  |                                   |
| 2. Ins       | strume    | entation to perform test includes:  |                 |  |                                   |
| a.           | Ha        | nd-held temperature probe   |                 |  |                                   |
|              |           | Calibration Date:(must be wit   | hin la          | st year)   |                                   |
| b.           | De        | vice capable of calculating enthalpy  |                 |  |                                   |
|              |           | Calibration Date:(must be with  | hin la          | st year)   |                                   |
| С.           | 1.2       | kOhm Resistor ( when specified by the manufacture   | er)             |  |                                   |
| 3. Ins       | stallati  | ion: (all of the following boxes should be checked)   |                 |  |                                   |
|              |           | Economizer high limit shutoff control complies wit<br>Section 140.4(e)3.  | th Tab          | ole 140.4-B found in the <del>2012</del> 2016 Build                                | ding Energy Efficiency Standards  |
|              |           | Economizer reliability features are present per 20  | 13 <u>201</u>   | 6 Building Energy Efficiency Standards   | Section 140.4(e)4:                |
|              |           | a. 5-year manufacturer warranty of econom   | izer a          | ssembly  |                                   |
|              |           | b. Provide a product specification sheet prov   | ving c          | apability of at least 60,000 actuations  |                                   |
|              |           | c. Provide a product specification sheet prov<br>in w.gA product specification sheet 3<br>AMCA Standard 500 or AMCA certificat<br>requirement (Class 1A, 1, and 2 are acc | howin<br>tion b | g the manufacturer's results after follo<br>y a third party under AMCA Publication | wing the testing procedures of    |
|              |           | <ul> <li>d. If the high limit setpoint is fixed dry-bulb or setpoint</li> </ul>   | or fixe         | ed enthalpy + fixed dry-bulb then the co   | ontrol shall have an adjustable   |
|              |           | e. Outdoor air, return air, mixed air, and sup  | ply ai          | r sensors shall be calibrated as follows:  |                                   |
|              |           | i. Drybulb and wetbulb temperatur   | es aco          | curate to ±2°F over the range of 40°F to   | 80°F                              |
|              |           | ii. Enthalpy accurate to ±3 Btu/lb o  | ver th          | e range of 20 Btu/lb to 36 Btu/lb  |                                   |
|              |           | iii. Relative humidity (RH) accurate  | to ±5           | % over the range of 20% to 80% RH  |                                   |
|              |           | f. Check that the sensor performance curve(<br>calibration are plotted on the performance)  |                 |  | out values measured during sensor |
|              |           | g. Sensors used for high limit control shall be<br>shielded from direct sunlight.   | e locat         | ted to prevent false readings, including   | but not limited to being properly |
|              |           | Unitary systems with an economizer have control<br>compressors off when economizers can provide pa  |                 |  | nermostats, that cycle            |
|              |           | System has return fan speed control, relief dampe<br>economizer mode.   | rs, or          | dedicated relief fans to prevent buildir   | ng over pressurization in full    |
|              | ٥         | For systems with DDC controls, sensor used for ec   | onom            | izer lockout has been factory or field c   | alibrated.                        |
|              |           | For systems with non-DDC controls, manufacturer   | 's sta          | rtup and testing procedures have been  | applied.                          |

#### © 2016 NEMIC

| NOMIC  |
|--|
| NATIONAL ENERGY MANAGEMENT INSTITUTE COMMITTEE |

|   | STATE OF CALIFORNIA<br>AIR ECONOMIZER CONTROLS ACCEPTAN  | ICE  |                           |             |  |
|---|--|--|---------------------------|-------------|--|
| TATE OF CALIFORNIA  | CEC-NRCA-MCH-05-A (Revised MM/YY)  | CALIF  | ORNIA ENERGY COMMISSI     |             |  |
| C-NRCA-MCH-05-A (Revised MM/YY)                                   | CERTIFICATE OF ACCEPTANCE  |  | NRCA-M                    | ICH-05-A    |  |
| ERTIFICATE OF ACCEPTANCE  | Air Economizer Controls Acceptance   | r  |                           | ge 2 of 3)  |  |
| ir Economizer Controls Acceptar                                   | Project Name:  | Enforcement Agency:                          | Permit Number:            |             |  |
| oject Name:   | Project Address:   | City:  | Zip Code:                 |             |  |
| oject Address:  | System Name or Identification/Tag:   | System Location or Area Served:              |                           |             |  |
| stem Name or Identification/Tag:                                  |  | 1  |                           |             |  |
|   | B. Functional Testing  |  | Re                        | esults      |  |
| ote: Submit one Certificate of Accep                              | Is the economizer listed in the CEC equipment certification direct   | pry? (if yes, proceed to Section D.)         | 2                         | (/N         |  |
| emonstrate compliance.  | Step 1: Disable demand control ventilation systems (if applicable  | e)   |                           |             |  |
| Construction Inspection   | Step 2: Enable the economizer and simulate a cooling demand la   | arge enough to drive the economizer fully o  | pen. Verify the following | 2           |  |
| . Supporting documentation nee                                    | a. Economizer damper modulates 100% open.  |  | 1                         | (/N         |  |
| <ul> <li>a. 20132016 Building Energy</li> </ul>                   | b. Return air damper modulates 100% closed.  |  | ,                         | (/N         |  |
| A-Glance).<br>b. <u>20132016</u> Building Energy                  | c. For systems that meet the criteria of 20132016 Building En<br>the economizer remains 100% open with the use of mecha<br>no longer be met by the economizer alone. |  |                           | (/N         |  |
| <ol><li>Instrumentation to perform tes</li></ol>                  | d. All applicable fans and dampers operate as intended to ma   | intain building pressure                     |                           | (/N         |  |
| a. Hand-held temperature p  | e. The unit heating is disabled (if applicable).   | and a solution by pressure.                  |                           | N / NA      |  |
| Calibration Date<br>b. Device capable of calculat                 | Step 3: Disable the economizer and simulate a cooling demand.  | Verify the following:                        |                           |             |  |
| Calibration Date  | a. Economizer damper closes to its minimum position.   | terny the following.                         | 1                         | (/N         |  |
| c. 1.2 kOhm Resistor ( when                                       | <ul> <li>All applicable fans and dampers operate as intended to maintain building pressure.</li> </ul>   |  |                           |             |  |
| Installation: (all of the following                               | C. The unit heating is disabled (if applicable).   |  |                           |             |  |
|   | Step 4: If the unit is equipped with heating, simulate a heating d   | emand and enable the economizer. Verify t    | he following:             |             |  |
| Economizer high limit   | <ul> <li>Economizer damper closes to its minimum position.</li> </ul>  |  |                           | N / NA      |  |
| Section 140.4(e)3.  | b. Return air damper opens.  |  |                           | N/NA        |  |
| <ul> <li>Economizer reliability</li> </ul>                        | Step 5: Turn off the unit and verify the following:  |  |                           |             |  |
| a. 5-year manuf   | a. Economizer damper closes completely.  |  |                           | (/N         |  |
| b. Provide a pro  | Step 6: System returned to initial operating conditions  |  |                           | (/N         |  |
| c. Provide a pro<br>in w.gA J                                     | Step 0. System returned to initial operating conditions  |  |                           | /           |  |
| AMCA Sta  | C. Testing Results   | · · · ·                                      | PAS                       | 5 / FAIL    |  |
| requireme   | Step 2: Simulate cooling load and enable the economizer (all answ  | vers are Y).                                 |                           | 1           |  |
| d. If the high lin  | Step 3: Simulate cooling load and disable the economizer (all ans  | -  |                           |             |  |
| setpoint<br>e. Outdoor air, I                                     | Step 4: Simulate heating demand and enable the economizer (all   | answers are Y).                              |                           |             |  |
| i. Dryb   | Step 5: Turn off the unit (all answers are Y).   |  |                           |             |  |
| ii. Enti  | -  |  | •                         |             |  |
| iii. Rel  | D. Evaluation  |  |                           |             |  |
| f. Check that th  | PASS: All Construction Inspection responses are complete   | and all Testing Results responses are "Pass" | or the economizer is list | ed in the 🚽 |  |
| calibration   | CEC equipment certification directory.   |  |                           |             |  |
| g. Sensors used<br>shielded fi                                    |  |  |                           |             |  |
|   |  |  |                           |             |  |
| <ul> <li>Unitary systems with<br/>compressors off when</li> </ul> |  |  |                           |             |  |
|   |  |  |                           |             |  |
| <ul> <li>System has return far<br/>economizer mode.</li> </ul>    |  |  |                           |             |  |
| For systems with DD(  |  |  |                           |             |  |
|   |  |  |                           |             |  |
| For systems with non  | L  |  |                           |             |  |
|   |  |  |                           |             |  |
|   |  |  |                           |             |  |
|   |  |  |                           |             |  |

#### © 2016 NEMIC

CA Building Energy Efficiency Standards - 20122016 Nonresidential Compliance

CA Building Energy Efficiency Standar

<Date>



## NA7.5.8 Supply Water Temperature Reset Controls Acceptance

© 2016 NEMIC



| STATE OF CALIFORNIA<br>SUPPLY WATER TEMPERATURE RESE<br>CEC-NRCA-MCH-09-A (Revised MW/YY)        | ET CONT            |  | ENERGY COMMI      | SSION         |
|--|--------------------|--|-------------------|---------------|
| CERTIFICATE OF ACCEPTANCE  |                    |  |                   | MCH-09-A      |
| Supply Water Temperature Controls Acceptance   |                    |  | (F                | age 1 of 3)   |
| Project Name:  | Enforcement Agen   | ey:  | Permit Numb       | er:           |
| Project Address:   | City:              |  | Zip Code:         |               |
| System Name or Identification/Tag:   | System Location or | r Area Served:   |                   |               |
| Note: Submit one Certificate of Acceptance for each sy that must demonstrate compliance.         | ystem              | Enforcement Agency Use: Checked by/Date                  |                   |               |
| Intent: Ensure that both the chilled water and ho<br>outdoor air temperature, as indicated in th |                    | ly temperatures are automatically reset base<br>quences. | d on either build | ling loads or |
| A. Construction Inspection   |                    |  |                   |               |
| 1. Supporting documentation needed to perform test include                                       | des, but not l     | imited to:   |                   |               |
| a. 20132016<br>Temperature Reset Controls Acceptance At-A-Gi                                     |                    | al Compliance Manual (NA7.5.8 Supply Wate                | er                |               |
| 2. Instrumentation to perform test includes, but is not limit                                    | ed to:             |  |                   |               |
| a. Calibrated reference temperature sensor, icewa  |                    |  |                   |               |
|  | be within las      |  |                   |               |
| 3. Document that hydronic system supply temperature sense  | sor(s) have b      | een factory or field calibrated: (check the fo           | lowing that app   | ly):          |
| Factory calibrated   |                    |  |                   |               |
| Provide supporting documentation.  |                    |  |                   |               |
| Field-calibrated by Controls contractor or other.  |                    |  |                   |               |
| Calibration complete, hydronic system supply ten     Provide supporting documentation.           | nperature se       | nsors within 1% of calibrated reference sens             | or, icewater or o | irywell bath. |
|  |                    |  |                   |               |
| B. Functional Testing  |                    |  |                   | Results       |
| Step 1: Test Maximum Reset Value   |                    |  |                   | -             |
| a. Change reset control variable to its maximum value.   | This can be a      | ccomplished by any one of the following (ch              | eck method):      |               |
| <ul> <li>Commanding at least one coil valve to 100% op</li> </ul>                                | en                 |  |                   |               |
| <ul> <li>Adjust discharge air temperature or zone temperature</li> </ul>                         | erature setpo      | oints to drive a valve into a 100% open.                 |                   |               |
| <ul> <li>Override actual outdoor air sensor to exceed m</li> </ul>                               | aximum wat         | er temperature boundary value.                           |                   |               |
| b. Verify that chilled or hot water temperature setpoint   | is reset to ap     | propriate value.   |                   | Y/N           |
| c. Verify that actual system temperature changes to with   | hin 2% of the      | e new setpoint.  |                   | Y/N           |
| Step 2: Test Minimum Reset Value   |                    |  |                   |               |
| a. Change reset control variable to its minimum value  |                    |  |                   |               |
| b. Verify that chilled or hot water temperature setpoint   |                    |  |                   | Y/N           |
| <ul> <li>Verify that actual system temperature changes to with</li> </ul>                        | hin 2% of the      | e new setpoint   |                   | Y/N           |
| Step 3: Test Automatic Control of Reset Control Variable.  |                    | <u> </u>   |                   |               |
| a. Restore reset control variable to automatic control   |                    |  |                   |               |
| b. Verify that chilled or hot water temperature setpoint   | is reset to ap     | propriate value  |                   | Y/N           |
| c. Verify that actual supply temperature changes to mee  |                    |  |                   | Y/N           |
| d. Verify that actual supply temperature changes to with   | hin 2% of the      | new setpoint   |                   | Y/N           |
| C. Testing Percette  |                    |  |                   | TAU.          |
| C. Testing Results System passes criteria in 1c, 2c and 3d                                       |                    | · · ·  | PASS /            | FAIL          |
|  |                    |  |                   |               |

© 2016 NEMIC

<Date>



#### ALIFORNIA ENERGY COMMISSIO

| ALC: NO DE                              |  |
|---|--|
| All shares of the local division of the |  |
| DN                                      |  |

NRCA-MCH-09-A (Page 2 of 3)

Permit Number: Zip Code:

| SUPPLY WATER TEMPER/                                      | CEC-NRCA-MCH-09-A (Revised MW/YY)<br>CERTIFICATE OF ACCEPTANCE |   |              |
|---|--|---|--------------|
| CEC-NRCA-MCH-09-A (Revised MM/YY)                         |  |   |              |
| CERTIFICATE OF ACCEPTANCE                                 | Supply Water Temperature Controls<br>Project Name:             | Acceptance<br>Enforcement Agency:           |              |
| Supply Water Temperature Controls Protect Neme:           | Project Herrie.  | choreanan Agarcy.                           |              |
|   | Project Address:   | City:                                       |              |
| Project Address:  | System Name or Identification/Tag:                             | System Location or Area Served:             |              |
| System Name or Identification/Tag:                        |  |   |              |
|   | D. Evaluation  |   |              |
| Note: Submit one Certificate of Acce                      | ·  |   | -            |
| that must demonstrate compliance.                         |  | responses are complete and all Testing Resu | Its response |
|   | Notes:   |   |              |
| Intent: Ensure that both the ch<br>outdoor air temperatur |  |   |              |
| outdoor an temperature                                    |  |   |              |
| A. Construction Inspection                                |  |   |              |
| 1. Supporting documentation needed to                     |  |   |              |
| 20132016 Building Energy Eff                              |  |   |              |
| a. Temperature Reset Controls /                           |  |   |              |
| 2. Instrumentation to perform test inclu-                 |  |   |              |
| a. Calibrated reference tempera                           |  |   |              |
| 1. Calibration Date:                                      |  |   |              |
| 3. Document that hydronic system suppl                    |  |   |              |
| Factory calibrated  |  |   |              |
| Provide supporting document                               |  |   |              |
| Field-calibrated by Controls co                           |  |   |              |
| <ul> <li>Calibration complete, hydronic</li> </ul>        |  |   |              |
| Provide supporting document                               |  |   |              |
|   |  |   |              |
| B. Functional Testing                                     |  |   |              |
| Step 1: Test Maximum Reset Value                          |  |   |              |
| a. Change reset control variable to its                   |  |   |              |
| Commanding at least one co                                |  |   |              |
| Adjust discharge air tempera                              |  |   |              |
| Override actual outdoor air s                             |  |   |              |
| b. Verify that chilled or hot water ten                   |  |   |              |
| c. Verify that actual system temperat                     |  |   |              |
| Step 2: Test Minimum Reset Value                          |  |   |              |
| a. Change reset control variable to its                   |  |   |              |
| b. Verify that chilled or hot water ten                   |  |   |              |
| c. Verify that actual system temperat                     |  |   |              |
| Step 3: Test Automatic Control of Reset                   |  |   |              |
| a. Restore reset control variable to au                   |  |   |              |
| b. Verify that chilled or hot water ten                   |  |   |              |
| c. Verify that actual supply temperate                    |  |   |              |
| d. Verify that actual supply temperati                    |  |   |              |

CA Building Energy Efficiency Standards -

|   | 1 |
|---|---|
|   | / |
| NATIONAL ENERGY MANAGEMENT INSTITUTE COMMITTE | E |

|   | STATE OF CALIFORNIA                                     | CERT     | IFICATE OF ACCEPTANCE- USER INSTRUCTIONS  | NRCA-MCH-09-A     |
|---|---|----------|---|-------------------|
| STATE OF CALIFORNIA   | SUPPLY WATER TEMPERATU                                  | Suppl    | ly Water Temperature Controls Acceptance  | (Page 1 of 1)     |
| SUPPLY WATER TEMPER   | CEC-NRCA-MCH-09-A (Revised MM/YY)                       |          |   |                   |
| CEC-NRCA-MCH-09-A (Revised MM/YY)                           | CERTIFICATE OF ACCEPTANCE                               |          | NRCA-MCH-09-A User Instructions   |                   |
| CERTIFICATE OF ACCEPTANCE                                   | Supply Water Temperature Controls Acce<br>Protect Name: |          |   |                   |
| Supply Water Temperature Control<br>Project Name:           |   | Section  | A. Construction Inspection  |                   |
|   | Project Address:  |          | This pre-test section consists of check boxes and data entry requirements. Complete check boxes   | and enter data    |
| Project Address:  | System Name or Identification/Tag:                      |          | as instructed.  |                   |
| System Name or Identification/Tag:                          |   |          | D. Functional Texture   |                   |
|   | D. Evaluation   | Section  | B. Functional Testing<br>This section consists of check boxes and yes or no questions arranged by individual test. Check ea   | ch box or circle  |
| Note: Submit one Certificate of Acce                        | · · · · · · · · · · · · · · · · · · ·                   |          | the correct answer for each specific test or line item.   | terr box or encie |
| that must demonstrate compliance.                           | PASS: All Construction Inspection resp                  |          |   |                   |
|   | Notes:  | Section  | n C. Testing Results  |                   |
| Intent: Ensure that both the c<br>outdoor air temperatu     |   |          | This section consists of check boxes for each test procedure. Complete check boxes as instructed  | -                 |
|   |   |          |   |                   |
| A. Construction Inspection                                  |   | Section  | D. Evaluation   |                   |
| 1. Supporting documentation needed to                       |   |          | Check the appropriate box as instructed.  |                   |
| 20132016 Building Energy E                                  |   | Declar   | ation Statements of Acceptance  |                   |
| a. Temperature Reset Controls                               |   | Decial   | This section contains fillable fields for three declaration statements: one from the Documentation  | n Author, one     |
| 2. Instrumentation to perform test inclu                    |   |          | from the Field Technician, and one from the Responsible Person. Each area contains a combination  |                   |
| a. Calibrated reference temper                              |   |          | boxes and data entry requirements, including signature; date; and license number. Complete che  |                   |
| 1. Calibration Date:  |   |          | enter data as instructed.   |                   |
| 3. Document that hydronic system supp                       |   |          |   |                   |
| Factory calibrated  |   |          | The Documentation Author is the person completing the form. The Field Technician is responsible   |                   |
| Provide supporting documen                                  |   |          | and documenting the results of the acceptance procedures on the Certificate of Acceptance form  |                   |
| Field-calibrated by Controls c                              |   |          | Technician must sign the Certificate of Acceptance to certify that the information he or she provi  |                   |
| Calibration complete, hydron                                |   |          | Certificate of Acceptance is true and correct. It is important to note that the Field Technician is no<br>have a contractor's, architect's or engineer's license. A Responsible Person is eligible under Divisi |                   |
| Provide supporting documen                                  |   |          | Business and Professions code in the applicable classification to take responsibility for the scope   |                   |
| R. Functional Testing                                       |   |          | specified by the Certificate of Acceptance document. The Responsible Person can also perform th   |                   |
| B. Functional Testing<br>Step 1: Test Maximum Reset Value   |   |          | and verification work, and if this is the case the Responsible Person must complete and sign both   | the Field         |
| a. Change reset control variable to it                      |   |          | Technician's signature block and the Responsible Person's signature block on the Certificate of A   |                   |
| · · · ·   |   |          | The Responsible Person assumes responsibility for the acceptance testing work performed by the  | Field             |
|   |   |          | Technician agent or employee.   |                   |
| Adjust discharge air temper     Override actual outdoor air |   |          |   |                   |
| b. Verify that chilled or hot water te                      |   |          |   |                   |
| c. Verify that actual system tempera                        |   |          |   |                   |
| Step 2: Test Minimum Reset Value                            |   |          |   |                   |
| a. Change reset control variable to it                      |   |          |   |                   |
| b. Verify that chilled or hot water te                      |   |          |   |                   |
| c. Verify that actual system tempera                        |   |          |   |                   |
| Step 3: Test Automatic Control of Rese                      |   |          |   |                   |
| a. Restore reset control variable to a                      |   |          |   |                   |
| b. Verify that chilled or hot water te                      |   |          |   |                   |
| c. Verify that actual supply tempera                        |   |          |   |                   |
| d. Verify that actual supply tempera                        |   |          |   |                   |
|   |   |          |   |                   |
| C. Testing Results  |   |          |   |                   |
| System passes criteria in 1c, 2c and 3d                     |   |          |   |                   |
|   |   |          |   |                   |
|   |   |          |   |                   |
| CA Building Energy Efficiency Standards                     |   |          |   |                   |
|   | CA Building Energy Efficiency Standards - 201           |          |   |                   |
|   | Server St entret Standards                              | CA Buile | ling Energy Efficiency Standards - 20132016 Nonresidential Compliance   | (Date)            |

© 2016 NEMIC



## NA7.5.9 Hydronic System Variable Flow Control Acceptance



| STATE OF CALIFORNIA<br>HYDRONIC SYSTEM VARIABLE FLOW CON<br>CEC-NRCA-MCH-10-A (Revised MMYY)                | ACCEPTANCE CALIFORNIA ENERGY COMMI  |               |  |  |  |  |
|---|---|---------------|--|--|--|--|
| CERTIFICATE OF ACCEPTANCE   |   | MCH-10-A      |  |  |  |  |
| Hydronic System Variable Flow Control Acceptance  | . ()  | Page 1 of 3)  |  |  |  |  |
| Project Name: E   | nforcement Agency: Permit Num   | ber:          |  |  |  |  |
| Project Address: C  | Xy: Zip Code:   |               |  |  |  |  |
| System Name or Identification/Tag: System Name or Identification/Tag:                                       | ystem Location or Area Served:  |               |  |  |  |  |
|   |   |               |  |  |  |  |
| Note: Submit one Certificate of Acceptance for each system that m<br>demonstrate compliance.                | Enforcement Agency Use: Checked by/Date   |               |  |  |  |  |
| tabanta   | tion to action and applied to de  |               |  |  |  |  |
| Intent: Ensure that hydronic pump speed varies with build   | aing neating and cooling lodas.   |               |  |  |  |  |
| A. Construction Inspection  |   |               |  |  |  |  |
| <ol> <li>Supporting documentation needed to perform test includes, but</li> </ol>                           | t not limited to:   |               |  |  |  |  |
| <ul> <li>As-built and/or Design Documents including Mechanical</li> </ul>                                   |   |               |  |  |  |  |
| 20122016 Building Energy Efficiency Standards Nonresid  |   |               |  |  |  |  |
| b. Variable Flow Control Acceptance At-A-Glance).   |   |               |  |  |  |  |
| <li>c. <u>2012/2016</u> Building Energy Efficiency Standards.</li>  |   |               |  |  |  |  |
| <ol><li>Instrumentation to perform test includes, but not limited to:</li></ol>                             |   |               |  |  |  |  |
| <ul> <li>Calibrated differential pressure gauge (hydronic manom</li> </ul>                                  | neter)  |               |  |  |  |  |
| 3. Installation:  |   |               |  |  |  |  |
| Pressure sensor location, setpoint, and reset control me<br>140.4(j) 6B.                                    | ets the requirements of <u>20222016</u> Building Energy Efficiency Stand                        | lards section |  |  |  |  |
| For systems without direct digital control of individual c  | oils reporting to the central control panel, differential pressure is n                         | neasured at   |  |  |  |  |
| or near the most remote heat exchanger or the heat exc  |   |               |  |  |  |  |
| valve requiring the most pressure, and the setpoint is no   | with central control panel, the static pressure set point is reset bas<br>o less than 80% open. | sed on the    |  |  |  |  |
| Exception taken{Heating hot water system or Condenser water system serving only water-cooled chillers}.     |   |               |  |  |  |  |
| 4. Document that all control pressure sensors are factory or field calibrated (check one of the following): |   |               |  |  |  |  |
| Factory calibrated  |   |               |  |  |  |  |
| Provide supporting documentation  |   |               |  |  |  |  |
| <ul> <li>Field calibrated by Controls contractor or other.</li> </ul>                                       |   |               |  |  |  |  |
| <ul> <li>Calibration completeAll pressure sensors ±10% of calibration</li> </ul>                            | brated reference sensor (Provide supporting documentation).                                     |               |  |  |  |  |
|   |   |               |  |  |  |  |
| B. Functional Testing   |   | Results       |  |  |  |  |
| Step 1: Minimum / Low flow test   |   |               |  |  |  |  |
| a. Close coil control valves to achieve a maximum of 50% of des   | sign flow   |               |  |  |  |  |
| b. Verify that the operating speed decreases  |   | Y/N           |  |  |  |  |
| c. Verify that the current operating speed has not increased (fo  |   | Y/N           |  |  |  |  |
| d. Record the system pressure as measured at the control sense  |   |               |  |  |  |  |
| Note: 2.31 ft w.c. = 1.0 psig   |   |               |  |  |  |  |
| e. Record the system pressure setpoint (either ft. w.c. or psig)  | ft w.c.   |               |  |  |  |  |
|   | psig  |               |  |  |  |  |
| f. Is the pressure reading on line 1.d. within 5% of pressure set   |   | Y/N           |  |  |  |  |
| g. Did the system operation stabilize within 5 minutes after con  | npietion of step 1.a.?  | Y/N           |  |  |  |  |
| Notes:  |   |               |  |  |  |  |
|   |   |               |  |  |  |  |
|   |   |               |  |  |  |  |
|   |   |               |  |  |  |  |
| CA Building Energy Efficiency Standards - 20122016 Nonresi  | idential Compliance   | <date></date> |  |  |  |  |

© 2016 NEMIC



| STATE OF CALIFORNIA<br>HYDRONIC SYSTEM VARIA                          | CERTIFICATE OF ACCEPTANCE- USER INSTRUCTIONS NRCA-MCH-10-A  |
|---|---|
| CEC-NRCA-MCH-10-A (Revised MMYY)                                      | Hydronic System Variable Flow Control Acceptance (Page 1 of 1)  |
| CERTIFICATE OF ACCEPTANCE   |   |
| Hydronic System Variable Flow Contro                                  | NRCA-MCH-10-A User Instructions   |
| Project Name:   |   |
| Project Address:  | Section A. Construction Inspection  |
| System Name or Identification/Tag:                                    | This pre-test section consists of check boxes and data entry requirements. Complete check boxes and enter data<br>as instructed.  |
|   | as instructed.  |
|   | Section B. Functional Testing   |
| Note: Submit one Certificate of Acceptance<br>demonstrate compliance. | This section consists of check boxes and yes or no questions arranged by individual test. Check each box or circle  |
|   | the correct answer for each specific test or line item.   |
| Intent: Ensure that hydronic pum                                      |   |
| incent. Ensure that hydronic pum                                      | Section C. Testing Results<br>This section consists of check boxes for each test procedure. Complete check boxes as instructed.   |
| A. Construction Inspection  | This section consists of check boxes for each test procedure, complete check boxes as instructed.   |
| 1. Supporting documentation needed to p                               | Section D. Evaluation   |
| a. As-built and/or Design Documer                                     | Check the appropriate box as instructed.  |
| 20132016 Building Energy Efficience                                   |   |
| b. Variable Flow Control Acceptance                                   | Declaration Statements of Acceptance  |
| c. 20122016 Building Energy Efficient                                 | This section contains fillable fields for three declaration statements: one from the Documentation Author, one  |
| 2. Instrumentation to perform test include                            | from the Field Technician, and one from the Responsible Person. Each area contains a combination of check<br>boxes and data entry requirements, including signature; date; and license number. Complete check boxes and         |
| a. Calibrated differential pressure                                   | enter data as instructed.   |
| 3. Installation:  |   |
| Pressure sensor location, setpoi                                      | The Documentation Author is the person completing the form. The Field Technician is responsible for performing  |
| 140.4(j) 6B.<br>For systems without direct digit                      | and documenting the results of the acceptance procedures on the Certificate of Acceptance forms. The Field  |
| or near the most remote heat e  | Technician must sign the Certificate of Acceptance to certify that the information he or she provides on the  |
| For systems with direct digital c                                     | Certificate of Acceptance is true and correct. It is important to note that the Field Technician is not required to   |
| valve requiring the most pressu                                       | have a contractor's, architect's or engineer's license. A Responsible Person is eligible under Division 3 of the<br>Business and Professions code in the applicable classification to take responsibility for the scope of work |
| Exception taken(Heating hot v   | specified by the Certificate of Acceptance document. The Responsible Person can also perform the field testing  |
| 4. Document that all control pressure sens                            | and verification work, and if this is the case the Responsible Person must complete and sign both the Field   |
| Factory calibrated  | Technician's signature block and the Responsible Person's signature block on the Certificate of Acceptance form.  |
| Provide supporting documentat   | The Responsible Person assumes responsibility for the acceptance testing work performed by the Field  |
| Field calibrated by Controls cont                                     | Technician agent or employee.   |
| Calibration completeAll pressu  |   |
|   |   |
| B. Functional Testing   |   |
| Step 1: Minimum / Low flow test                                       |   |
| a. Close coil control valves to achieve a                             |   |
| b. Verify that the operating speed decre                              |   |
| c. Verify that the current operating spe                              |   |
| d. Record the system pressure as measure                              |   |
|   |   |

© 2016 NEMIC

CA Building Energy Efficiency Standard

Notes:

Note: 2.31 ft w.c. = 1.0 psig e. Record the system pressure setpoint f. Is the pressure reading on line 1.d. w g. Did the system operation stabilize wi

#### CA Building Energy Efficiency Standards - 20122016 Nonresidential Compliance

<Date>



## NA7.5.11 Fault Detection and Diagnostics (FDD) for Packaged Direct-Expansion (DX) Units Acceptance



| STATE OF CALIFORNIA<br>FAULT DETECTION AND DIAGNOSTI<br>[ CEC-NRCA-MCH-12-A (Revised MM/YY)  | C <b>S</b> FOR P   |   | ISION UNIT         |               |  |
|--|--------------------|---|--------------------|---------------|--|
| CERTIFICATE OF ACCEPTANCE  |                    | CALIFOR                                   |                    | CA-MCH-12-A   |  |
| Fault Detection and Diagnostics (FDD) for Packaged   | Direct Expan:      | sion Units                                |                    | (Page 1 of 3) |  |
| Project Name:  |                    |   | Permit Number:     |               |  |
| Project Address:   | City:              |   | Zip Code:          |               |  |
| System Name or Identification/Tag:   | System Location or | Area Served:                              |                    |               |  |
|  |                    |   |                    |               |  |
| Note: Submit one Certificate of Acceptance for each syste<br>demonstrate compliance.   | m that must        | Enforcement Agency Use: Checked by/       | Date               |               |  |
| A. Construction Inspection   |                    |   |                    |               |  |
| 1. Prior to functional testing, verify and document the fol  | lowing:            |   |                    |               |  |
| <ul> <li>The Fault Detection and Diagnostics (FDD) has</li> </ul>  | rdware is instal   | led on the unit.                          |                    |               |  |
| The FDD system is certified to the California E  | nergy Commiss      | sion.                                     |                    |               |  |
| 2. The following air temperature sensors are permanently   | y installed:       |   |                    |               |  |
| Outside Air Sensor   |                    |   |                    |               |  |
| Supply Air Sensor  |                    |   |                    |               |  |
| <ul> <li>Return Air Sensor (applicable for differential end)</li> </ul>  | economizer ope     | eration only)                             |                    |               |  |
| B. Functional Testing  |                    |   |                    |               |  |
| Air Temperature Sensor Failure/Fault   |                    |   |                    |               |  |
| Step 1: Verify the FDD system indicates normal operation   | n                  |   |                    |               |  |
| Step 2: Disconnect outside air temperature sensor from   | unit controller.   | Verify the following:                     |                    |               |  |
| FDD system reports a fault   |                    |   |                    |               |  |
| Step 3: Connect outside air temperature sensor to unit o   | ontroller. Verif   | fy the following:                         |                    |               |  |
| FDD system indicates normal operation  |                    |   |                    |               |  |
| Excess Outside Air   |                    |   |                    |               |  |
| Step 1: Coordinate this test with NRCA-MCH-02-A (NA 7.   | 5.1 Outdoor Air    | r), if NRCA-MCH-02-A indicates "pass" the | n verify the follo | wing:         |  |
| FDD system indicates normal operation  |                    |   |                    |               |  |
| Economizer Operation   |                    |   |                    |               |  |
| Step 1: Coordinate this test with NRCA-MCH-05-A (NA 7.<br>economizer damper by disconnecting the control signal fr<br>the following: |                    |   |                    |               |  |
| FDD system reports a fault   |                    |   |                    |               |  |
| Step 2: Successfully complete and pass NRCA-MCH-05-A   | and verify the     | following:                                |                    |               |  |
| FDD system reports normal operation  |                    |   |                    |               |  |
| C Tacting Results  |                    |   |                    | ( 540         |  |
| C. Testing Results<br>Test passes if all boxes are checked under Functional Tes  | ting               |   | PASS               |               |  |
| resupasses if all boxes are checked under Pullcholidi les  | ung.               |   |                    | -             |  |
|  |                    |   |                    |               |  |



| STATE OF CALIFORNIA<br>FAULT DETECTION AND DIAGI<br>CEC-NRCA-NCH-12-A (Revised MM/YY) | STATE OF CALIFORNIA<br>FAULT DETECTION AND DIAGNOSTIC<br>CEC-NRCA-MCH-12-A (Revised MWYY)<br>CERTIFICATE OF ACCEPTANCE | CS FOR PACKAGED DIRECT EXPAN    | ISION UNITS    |
|---|--|---------------------------------|----------------|
| CERTIFICATE OF ACCEPTANCE   | Fault Detection and Diagnostics (FDD) for Packaged   | (Page 2 of 3)                   |                |
| Fault Detection and Diagnostics (FDD) for F   | Project Name:  | Enforcement Agency:             | Permit Number: |
| Project Address:  | Project Address:   | City:                           | Zip Code:      |
| Project Address:  | System Name or Identification/Tag:   | System Location or Area Served: | ·              |

| Note: Submit one Certificate of Acceptance for a  | D Evaluation   |
|---|--|
| demonstrate compliance.                           | PASS: All Construction Inspection responses are complete and Testing Results is "Pass" |
|   | Notes:   |
| A. Construction Inspection                        |  |
| 1. Prior to functional testing, verify and docume |  |
| The Fault Detection and Diagnostics               |  |
| The FDD system is certified to the Ci             |  |
| 2. The following air temperature sensors are pe   |  |
| Outside Air Sensor                                |  |

Supply Air Sensor

Return Air Sensor (applicable for dif

#### B. Functional Testing

System Name or Identification/Tag:

Air Temperature Sensor Failure/Fault

Step 1: Verify the FDD system indicates normal

Step 2: Disconnect outside air temperature sen

FDD system reports a fault

Step 3: Connect outside air temperature sensor

FDD system indicates normal operatio

Excess Outside Air

Step 1: Coordinate this test with NRCA-MCH-02

FDD system indicates normal operatio

Economizer Operation

Step 1: Coordinate this test with NRCA-MCH-05 economizer damper by disconnecting the contrithe following:

FDD system reports a fault

Step 2: Successfully complete and pass NRCA-N

FDD system reports normal operation

C. Testing Results

Test passes if all boxes are checked under Funct

#### © 2016 NEMIC

| N        |        |         | ИТ       |          |        |
|----------|--------|---------|----------|----------|--------|
|          |        |         |          |          | $\cup$ |
| NATIONAL | ENERGY | MANAGEM | ENT INST | ТИТЕ СОМ | MITTEE |

| _  |  |   |                                   |
|--|--|---|-----------------------------------|
|  | STATE OF CALIFORNIA                                    | CERTIFICATE OF ACCEPTANCE- USER INSTRUCTIONS  | NRCA-MCH-12-A                     |
| STATE OF CALIFORNIA  | CEC-NRCA-MCH-12-A (Revised MM/YY)                      | Fault Detection and Diagnostics (FDD) for Packaged Direct Expansion Units   | (Page 1 of 1)                     |
| FAULT DETECTION AND<br>CEC-NRCA-MCH-12-A (Revised MM/YY)                                     | CERTIFICATE OF ACCEPTANCE                              | NRCA-MCH-12-A User Instructions   |                                   |
| CERTIFICATE OF ACCEPTANCE  | Fault Detection and Diagnostics (FDD)<br>Project Name: | Mich-Mich-12-A Oser Instructions  |                                   |
| Fault Detection and Diagnostics (<br>Project Name:   | Project Address:                                       | Section A. Construction Inspection  |                                   |
| Project Address:   |  | This pre-test section consists of check boxes and data entry requirements. Compl<br>as instructed.  | ete check boxes and enter data    |
|  | System Name or Identification/Tag:                     | as instructeu.  |                                   |
| System Name or Identification/Tag:   |  | Section B. Functional Testing   |                                   |
| Nata Subarit and Castificate of Assa   | D Evaluation   | This section consists of check boxes and yes or no questions arranged by individu   | al test. Check each box or circle |
| Note: Submit one Certificate of Acce<br>demonstrate compliance.                              | PASS: All Construction Inspection res                  | the correct answer for each specific test or line item.   |                                   |
|  | Notes:   | Section C. Testing Results  |                                   |
| A. Construction Inspection   |  | This section consists of check boxes for each test procedure. Complete check box  | es as instructed.                 |
| 1. Prior to functional testing, verify a   |  | Section D. Evaluation   |                                   |
| The Fault Detection and I  |  | Check the appropriate box as instructed.  |                                   |
| The FDD system is certific   |  |   |                                   |
| 2. The following air temperature sen   |  | Declaration Statements of Acceptance  |                                   |
| Outside Air Sensor   |  | This section contains fillable fields for three declaration statements: one from the<br>from the Field Technician, and one from the Responsible Person. Each area conta |                                   |
| Supply Air Sensor  |  | from the rieid recipician, and one from the Responsible Person. Each area conta<br>boxes and data entry requirements, including signature; date; and license numbe      |                                   |
| Return Air Sensor (applic  |  | enter data as instructed.   |                                   |
| B. Functional Testing  |  |   |                                   |
| Air Temperature Sensor Failure/Fau   |  | The Documentation Author is the person completing the form. The Field Technici<br>and documenting the results of the acceptance procedures on the Certificate of A      |                                   |
| Step 1: Verify the FDD system indica   |  | Technician must sign the Certificate of Acceptance procedures on the certificate of A   |                                   |
| Step 2: Disconnect outside air temp  |  | Certificate of Acceptance is true and correct. It is important to note that the Field   | Technician is not required to     |
| FDD system reports a fault   |  | have a contractor's, architect's or engineer's license. A Responsible Person is elig  |                                   |
| Step 3: Connect outside air tempera  |  | Business and Professions code in the applicable classification to take responsibilit<br>specified by the Certificate of Acceptance document. The Responsible Person car |                                   |
|  |  | and verification work, and if this is the case the Responsible Person must complete   |                                   |
| FDD system indicates norm  |  | Technician's signature block and the Responsible Person's signature block on the  |                                   |
| Excess Outside Air   |  | The Responsible Person assumes responsibility for the acceptance testing work p<br>Technician agent or employee.  | erformed by the Field             |
| Step 1: Coordinate this test with NR   |  | reclinician agent of employee.  |                                   |
| FDD system indicates norm  |  |   |                                   |
| Economizer Operation   |  |   |                                   |
| Step 1: Coordinate this test with NR<br>economizer damper by disconnecting<br>the following: |  |   |                                   |
| FDD system reports a fault   |  |   |                                   |
| Step 2: Successfully complete and p  |  |   |                                   |
| FDD system reports normal  |  |   |                                   |
|  |  |   |                                   |
| C. Testing Results   |  |   |                                   |
| Test passes if all boxes are checked u   |  |   |                                   |
|  |  |   |                                   |
|  |  |   |                                   |
| CA Building Energy Efficiency Star   | CA Building Energy Efficiency Standard                 |   |                                   |

© 2016 NEMIC

CA Building Energy Efficiency Standards - 20122016 Nonresidential Compliance



## NA7.5.12 FDD for Air Handling Units and Zone Terminal Units Acceptance

38



| AU<br>ZO | NE TE   | TIC FAULT DETECTION AND D<br>RMINAL UNITS ACCEPTANCE                                  | IAGNOSTICS FOR AIR HANDLING U                               |                            |  |  |  |
|----------|---|---|---|----------------------------|--|--|--|
|          | CEC-NRCA-MCH-13-A (Revised MMYY) CALIFORNIA ENERGY COMMISSION CERTIFICATE OF ACCEPTANCE NRCA-MCH-13-F |   |   |                            |  |  |  |
|          |   |   | r Handling Units and Zone Terminal Units Acceptan           |                            |  |  |  |
|          | ect Name:   |   | Enforcement Agency:   | Permit Number:             |  |  |  |
| Proje    | ect Address:  |   | City:   | Zip Code:                  |  |  |  |
| Syste    | em Name or Ide  | ntification/Tag:  | System Location or Area Served:                             |                            |  |  |  |
|          |   |   |   |                            |  |  |  |
|          |   | one Certificate of Acceptance for each system ti<br>compliance.                       | hat must Enforcement Agency Use: Checked by/Date            |                            |  |  |  |
|          | intent:   | Verify that the system detects common faults  | in air handling units and zone terminal units.              |                            |  |  |  |
| <u> </u> |   |   | -   |                            |  |  |  |
| Α.       | Construc  | tion Inspection   |   |                            |  |  |  |
| 1.1      | nstrument   | ation to perform test includes, but not limited t                                     | 0:  |                            |  |  |  |
|          |   |   | emented at the building automation system control static    | on.                        |  |  |  |
| 2.1      | nstallation   |   |   | inducia, an additional     |  |  |  |
|          | 3   | e functional testing verifies proper installation o<br>tallation checks are required. | f the controls for FDD for air handling units and zone tern | ninal units. No additional |  |  |  |
|          |   | •   |   |                            |  |  |  |
| в.       | Function  | al Testing for Air Handling Units   |   |                            |  |  |  |
| Tes      | Testing of each AHU with FDD controls shall include the following tests:                              |   |   |                            |  |  |  |
| Ste      | p 1: Senso  | or Drift/Failure  |   | -                          |  |  |  |
| a.       | Disconn   | ect outside air temperature sensor from unit co                                       | ntroller  | Y/N                        |  |  |  |
| b.       | b. Verify that the FDD system reports a fault Y   |   |   |                            |  |  |  |
| с.       | Connect   | OAT sensor to the unit controller   |   | Y/N                        |  |  |  |
| d.       | Verify t  | at FDD indicates normal system operation  |   | Y/N                        |  |  |  |
| Ste      | ep 2: Damp  | er/Actuator Fault   |   | •                          |  |  |  |
| а.       | From th   | e control system workstation, command the mix   | ing box dampers to full open (100% outdoor air)             | Y/N                        |  |  |  |
| b.       | Disconn   | ect power to the actuator and verify that a fault                                     | is reported at the control workstation                      | Y/N                        |  |  |  |
| с.       | Reconn  | ect power to the actuator and command the mix   | ing box dampers to full open                                | Y/N                        |  |  |  |
| d.       | Verify t  | at the control system does not report a fault   | •   | Y/N                        |  |  |  |
| e.       |   |   | ing box dampers to a full-closed position (0% outdoor air   | i) Y/N                     |  |  |  |
| f.       |   | ect power to the actuator and verify that a fault                                     |   | Y/N                        |  |  |  |
| g.       |   | ect power to the actuator and command the dar   |   | Y/N                        |  |  |  |
| ь.<br>h. |   | hat the control system does not report a fault du                                     |   | Y/N                        |  |  |  |
|          | veny u  | as the control system does not report a fault of                                      | and remain operation  | ./ 8                       |  |  |  |

| NOMIC  |  |
|--|--|
| NATIONAL ENERGY MANAGEMENT INSTITUTE COMMITTEE |  |

| STATE OF CALIFORNIA<br>AUTOMATIC FAULT DETI<br>ZONE TERMINAL UNITS / | STATE OF CALIFORNIA<br>AUTOMATIC FAULT DETECTION AND D<br>ZONE TERMINAL UNITS ACCEPTANCE<br>CEC-NRCA-MCH-13-A (Revised MWYY)<br>CERTIFICATE OF ACCEPTANCE |   |                |
|--|---|---|----------------|
| CEC-NRCA-MCH-13-A (Revised MM/YY)                                    |   |   |                |
| CERTIFICATE OF ACCEPTANCE  |   |   |                |
| Automatic Fault Detection and Dia<br>Project Name:                   | Project Name:   | Enforcement Agency:   | Permit Number: |
| Project Name:  | Project Address:  | City:   | Zip Code:      |
| Project Address:   |   |   |                |
| System Name or Identification/Tag:                                   | System Name or Identification/Tag:  | System Location or Area Served:                               |                |
| System Name or Identificationy lag:                                  |   |   |                |
|  |   |   |                |
| Note: Submit one Certificate of Accept                               | Step 3: Valve/actuator fault  |   |                |
| demonstrate compliance.  | a. From the control system workstation, command the he  | ating coil valves to full open.                               | Y/N            |
| Intent: Verify that the system a                                     | b. Disconnect power to the actuator and verify that a fault   | is reported   | Y/N            |
|  | c. Reconnect power to the actuator and command the her  | ating coil valve to full open                                 | Y/N            |
| A. Construction Inspection   | d. Verify that the control system does not report a fault   |   | Y/N            |
| 1. Instrumentation to perform test inc                               | e. From the control system workstation, command the co  | oling coil valve to the full open position.                   | Y/N            |
| a. No instrumentation is required.                                   | f. Disconnect power to the actuator and verify that a fault   | is reported   | Y/N            |
| The functional testing verific                                       | g. Reconnect power to the actuator and command the co   | oling coil valve to full open                                 | Y/N            |
| • installation checks are requi                                      | h. Verify that the control system does not report a fault   |   | Y/N            |
| B. Functional Testing for Air Hand                                   | Step 4: Inappropriate simultaneous heating, mechanical co   | oling, and/or economizing                                     |                |
| Testing of each AHU with FDD controls                                | From the control system workstation, override the heat  | ing coil valve and verify that a fault is reported at the con | itrol          |
| Step 1: Sensor Drift/Failure   | a. workstation  |   | Y/N            |
| a. Disconnect outside air temperatu                                  | <ul> <li>From the control system workstation, override the cool<br/>workstation</li> </ul>  | ing coil valve and verify that a fault is reported at the con | trol Y/N       |
| b. Verify that the FDD system repor                                  | C C   | ng box dampers and verify that a fault is reported at the o   | control Y/N    |
| c. Connect OAT sensor to the unit c                                  | workstation   |   |                |
| d. Verify that FDD indicates normal                                  |   |   |                |

Step 2: Damper/Actuator Fault

- a. From the control system worksta
- b. Disconnect power to the actuato
- c. Reconnect power to the actuator
- d. Verify that the control system do
- e. From the control system worksta
- f. Disconnect power to the actuato
- g. Reconnect power to the actuator
- h. Verify that the control system do

| NOMIC  |  |
|--|--|
| NATIONAL ENERGY MANAGEMENT INSTITUTE COMMITTEE |  |

| -   | STATE OF CALIFORNIA  | STATE OF CALIFORNIA<br>AUTOMATIC FAULT DETECTION AND DIA  | AGNOSTICS FOR AIR HANDLING UNI  | TS AND                        |
|---|--|---|---|-------------------------------|
| STATE OF CALIFORNIA   | AUTOMATIC FAULT DETEC  | ZONE TERMINAL UNITS ACCEPTANCE  |   |                               |
| AUTOMATIC FAULT DET   | ZONE TERMINAL UNITS AC   | CEC-NRCA-MCH-13-A (Revised MMYY)<br>CERTIFICATE OF ACCEPTANCE   | CALIFORNIA ENE  | RGY COMMISSION WIRCA-MCH-13-A |
| ZONE TERMINAL UNITS   | CEC-NRCA-MCH-13-A (Revised MM/YY)<br>CERTIFICATE OF ACCEPTANCE                     | Automatic Fault Detection and Diagnostics (FDD) for Air I   | Handling Units and Zone Terminal Units Accentance   | (Page 3 of 5)                 |
| CEC-NRCA-MCH-13-A (Revised MM/YY)<br>CERTIFICATE OF ACCEPTANCE          | Automatic Fault Detection and Diagno   |   |   | ermit Number:                 |
| Automatic Fault Detection and Di  | Project Name:  |   |   |                               |
| Project Name:   | Project Address:   | Project Address:  | City: 2   | lp Code:                      |
| Project Address:  |  | System Name or identification/Tag:  | System Location or Area Served:   |                               |
| System Name or Identification/Tag:                                      | System Name or Identification/Tag:   |   |   |                               |
|   |  | C. Functional Testing for Zone Terminal Units   |   |                               |
| Note: Submit one Certificate of Accep<br>demonstrate compliance.        | Step 3: Valve/actuator fault   | Testing shall be performed on one of each type of terminal unit<br>shall be tested.                                       | t (VAV box) in the project. A minimum of 5% of the termina                                    | al boxes Results              |
| demonstrate compnance.  | a. From the control system workstation   | Step 1: Sensor drift/failure  |   |                               |
| Intent: Verify that the system  | b. Disconnect power to the actuator an<br>c. Reconnect power to the actuator and   | a. Disconnect the tubing to the differential pressure sensor  | of the VAV box  | Y/N                           |
| A. Construction Inspection  | d. Verify that the control system does n   | b. Verify that control system detects and reports the fault   |   | Y/N                           |
| 1. Instrumentation to perform test in                                   |  | c. Reconnect the sensor and verify proper sensor operation  |   | Y/N                           |
| a. No instrumentation is requ   | e. From the control system workstation<br>f. Disconnect power to the actuator an   | d. Verify that the control system does not report a fault   |   | Y/N                           |
| 2. Installation<br>The functional testing verif                         | · · · ·  | Step 2: Damper/actuator fault – damper stuck open   |   |                               |
| a. installation checks are requ   | g. Reconnect power to the actuator and<br>h. Verify that the control system does n | a. Command the damper to be fully open  |   | Y/N                           |
| B. Functional Testing for Air Hand                                      | Step 4: Inappropriate simultaneous heati   | b. Disconnect the actuator to the damper  |   | Y/N                           |
| Testing of each AHU with FDD contro                                     | From the control system workstation  | Adjust the cooling setpoint so that the room temperature  | e is below the cooling setpoint to command the damper to                                      | the                           |
| Step 1: Sensor Drift/Failure  | a. workstation   | c. minimum position. Verify that the control system reports   | s a fault   | Y/N                           |
| a. Disconnect outside air temperat                                      | b. From the control system workstation<br>workstation                              | d. Reconnect the actuator and restore to normal operation   |   | Y/N                           |
| b. Verify that the FDD system repo                                      | c. From the control system workstation workstation                                 | Step 3: Damper/actuator fault – damper stuck closed   |   |                               |
| c. Connect OAT sensor to the unit                                       | WORSCHUIT  | a. Set the damper to the minimum position   |   | Y/N                           |
| d. Verify that FDD indicates norma                                      |  | b. Disconnect the actuator to the damper  |   | Y/N                           |
| Step 2: Damper/Actuator Fault   |  | c. Set the cooling setpoint below the room temperature to<br>fault  | simulate a call for cooling. Verify that the control system r                                 | reports a Y / N               |
| a. From the control system workst<br>b. Disconnect power to the actuate |  | d. Reconnect the actuator and restore to normal operation   |   | Y/N                           |
| c. Reconnect power to the actuato                                       |  | Step 4: Valve/actuator fault (For systems with hydronic rehea   | it)   |                               |
| d. Verify that the control system d                                     |  | a. Command the reheat coil valve to (full) open   |   | Y/N                           |
| e. From the control system workst                                       |  | b. Disconnect power to the actuator. Set the heating setpoi<br>to command the valve closed. Verify that the fault is repo | int temperature to be lower than the current space temper<br>orted at the control workstation | rature, Y/N                   |
| f. Disconnect power to the actuate                                      |  | c. Reconnect the actuator and restore normal operation  |   | Y/N                           |
| g. Reconnect power to the actuato                                       |  | Step 5: Feedback loop tuning fault (unstable airflow)   |   |                               |
| h. Verify that the control system d                                     |  | a. Set the integral coefficient of the box controller to a valu<br>simulate a call for cooling.                           | e 50 times the current value. Lower the space cooling setp                                    | oint to                       |
|   |  | b. The damper cycles continuously and airflow is unstable.  | Verify that the control system detects and reports the fault                                  | t Y/N                         |
|   |  | c. Reset the integral coefficient of the controller to the orig   | inal value to restore normal operation  | Y/N                           |
|   |  | Step 6: Disconnected inlet duct   |   |                               |
|   |  | a. From the control system workstation, command the dam   | nper to minimum position.   | Y/N                           |
|   |  | b. Disconnect power to the actuator and verify that a fault i   | is reported at the control workstation.   | Y/N                           |
|   |  | c. Reset the space temperature setpoint back to its original  | value.  | Y/N                           |
| CA Building Energy Efficiency Standar                                   |  | · · ·   |   |                               |

CA Building Energy Efficiency Standards - 2

© 2016 NEMIC

CA Building Energy Efficiency Standards - 20132016 Nonresidential Compliance

41



|   |  | STATE OF CALIFORNIA  | STATE OF CALIFORNIA<br>AUTOMATIC FAULT DETECTION AND D             | IAGNOSTICS FOR AIR HANDLING UI                      | NITS AND        |         |
|---|--|--|--|---|-----------------|---------|
|   | STATE OF CALIFORNIA  | AUTOMATIC FAULT DETECT   | ZONE TERMINAL UNITS ACCEPTANCE<br>CEC-NRCA-MCH-13-A (Revised MMYY) | CALIFORNIA F  | NERGY COMMISSIO | N COM   |
| STATE OF CALIFORNIA   | AUTOMATIC FAULT DETE                                       | ZONE TERMINAL UNITS ACC<br>CEC-NRCA-MCH-13-A (Revised MM/YY)                           | CERTIFICATE OF ACCEPTANCE  |   | NRCA-MC         | H-13-A  |
| AUTOMATIC FAULT D   | ZONE TERMINAL UNITS A<br>CEC-NRCA-MCH-13-A (Revised MM/YY) | CERTIFICATE OF ACCEPTANCE  | Automatic Fault Detection and Diagnostics (FDD) for Ai             | r Handling Units and Zone Terminal Units Acceptance |                 | 4 of 5) |
| ZONE TERMINAL UNIT<br>CEC-NRCA-MCH-13-A (Revised MM/YY)           | CERTIFICATE OF ACCEPTANCE                                  | Automatic Fault Detection and Diagnos  | Project Name:  | Enforcement Agency:                                 | Permit Number:  |         |
| CERTIFICATE OF ACCEPTANCE   | Automatic Fault Detection and Diag                         | Project Name:  | Project Address:   | City:   | Zip Code:       |         |
| Automatic Fault Detection and                                     | Project Name:  | Project Address:   | Project Address.   | City.   | 2000            |         |
| Project Name:   | Project Address:   |  | System Name or Identification/Tag:                                 | System Location or Area Served:                     |                 |         |
| Project Address:  | System Name or Identification/Tag:                         | System Name or Identification/Tag:   |  |   |                 |         |
| System Name or Identification/Tag:                                |  |  | D. Testing Results   |   | PASS / I        | FAIL    |
|   |  | C. Functional Testing for Zone Termi   | Test passes if all applicable answers are yes under Functional     | Testing Sections                                    |                 |         |
| Note: Submit one Certificate of Ac                                | Step 3: Valve/actuator fault                               | Testing shall be performed on one of each t  |  |   |                 |         |
| demonstrate compliance.   | a. From the control system workstat                        | shall be tested.<br>Step 1: Sensor drift/failure                                       | E. Evaluation  |   |                 |         |
| Intent: Verify that the syst                                      | b. Disconnect power to the actuator                        | a. Disconnect the tubing to the different  | PASS: All Construction Inspection responses are compl              | ete and all Testing Results responses are "Pass"    |                 |         |
|   | c. Reconnect power to the actuator                         | b. Verify that control system detects and  |  |   |                 |         |
| A. Construction Inspection  | d. Verify that the control system doe                      |  |  |   |                 |         |
| 1. Instrumentation to perform tes     a. No instrumentation is re | e. From the control system workstat                        | c. Reconnect the sensor and verify prop  |  |   |                 |         |
| 2. Installation   | f. Disconnect power to the actuator                        | d. Verify that the control system does no  |  |   |                 |         |
| a. The functional testing v<br>installation checks are r          | g. Reconnect power to the actuator                         | Step 2: Damper/actuator fault – damper st  |  |   |                 |         |
|   | h. Verify that the control system doe                      | a. Command the damper to be fully ope  |  |   |                 |         |
| B. Functional Testing for Air H                                   | Step 4: Inappropriate simultaneous he                      | b. Disconnect the actuator to the dampe  |  |   |                 |         |
| Testing of each AHU with FDD con                                  | a. From the control system workstat workstation            | Adjust the cooling setpoint so that the<br>minimum position. Verify that the cor       |  |   |                 |         |
| Step 1: Sensor Drift/Failure                                      | From the control system workstat                           | d. Reconnect the actuator and restore to   |  |   |                 |         |
| a. Disconnect outside air temp                                    | b. workstation<br>From the control system workstat         | Step 3: Damper/actuator fault – damper st  |  |   |                 |         |
| b. Verify that the FDD system r<br>c. Connect OAT sensor to the u | c. workstation   | a. Set the damper to the minimum posit   |  |   |                 |         |
| d. Verify that FDD indicates nor                                  |  | · · · · · · · · · · · · · · · · · · ·  |  |   |                 |         |
| Step 2: Damper/Actuator Fault                                     |  | b. Disconnect the actuator to the dampe<br>Set the cooling setpoint below the roc      |  |   |                 |         |
| · · ·   |  | c. fault   |  |   |                 |         |
| a. From the control system wor                                    |  | d. Reconnect the actuator and restore to   |  |   |                 |         |
| b. Disconnect power to the actu                                   |  | Step 4: Valve/actuator fault (For systems w  |  |   |                 |         |
| d. Verify that the control syster                                 |  | a. Command the reheat coil valve to (ful   |  |   |                 |         |
| e. From the control system wo                                     |  | Disconnect power to the actuator. Set  |  |   |                 |         |
| f. Disconnect power to the act                                    |  | to command the valve closed. Verify t  |  |   |                 |         |
| g. Reconnect power to the actu                                    |  | c. Reconnect the actuator and restore n<br>Step 5: Feedback loop tuning fault (unstabl |  |   |                 |         |
| h. Verify that the control syster                                 |  | Set the integral coefficient of the box  |  |   |                 |         |
| II. Forty date the control system                                 |  | a. simulate a call for cooling.  |  |   |                 |         |
|   |  | b. The damper cycles continuously and a  |  |   |                 |         |
|   |  | c. Reset the integral coefficient of the co  |  |   |                 |         |
|   |  | Step 6: Disconnected inlet duct  |  |   |                 |         |
|   |  | a. From the control system workstation,  |  |   |                 |         |
|   |  | b. Disconnect power to the actuator and  |  |   |                 |         |
|   |  | c. Reset the space temperature setpoint  |  |   |                 |         |
| CA Building Energy Efficiency Stan                                |  |  |  |   |                 |         |
|   | CA Building Energy Efficiency Standards                    |  |  |   |                 |         |
|   |  | CA Building Energy Efficiency Standards - 20   |  |   |                 |         |
|   |  |  | I  |   |                 |         |

42



|  |   | _   |  | F   |
|--|---|---|--|---|
|  |   |   | STATE OF CALIFORNIA  | CERTIFICATE OF ACCEPTANCE – USER INSTRUCTIONS NRCA-MCH-13-/   |
|  |   | STATE OF CALIFORNIA   | AUTOMATIC FAULT DETECT                                       | Automatic Fault Detection and Diagnostics (FDD) for Air Handling Units and Zone Terminal Units Acceptance (Page 1 of 1)   |
|  | STATE OF CALIFORNIA                                   | AUTOMATIC FAULT DETI  | ZONE TERMINAL UNITS AC(<br>CEC-NRCA-MCH-13-A (Revised MM/YY) |   |
| STATE OF CALIFORNIA                                      | AUTOMATIC FAULT D                                     | ZONE TERMINAL UNITS /<br>CEC-NRCA-MCH-13-A (Revised MMYY)                               | CERTIFICATE OF ACCEPTANCE                                    | NRCA-MCH-13-A User Instructions   |
| AUTOMATIC FAUL   | ZONE TERMINAL UNI<br>CEC-NRCA-MCH-13-A (Revised MM/Y) | CERTIFICATE OF ACCEPTANCE   | Automatic Fault Detection and Diagnos                        | Section A. Construction Inspection  |
| ZONE TERMINAL U<br>CEC-NRCA-MCH-13-A (Revised)           | CERTIFICATE OF ACCEPTANCE                             | Automatic Fault Detection and Dia   | Project Name:  | This pre-test section consists of check boxes and data entry requirements. Complete check boxes and enter data  |
| CERTIFICATE OF ACCEPT/                                   | Automatic Fault Detection and                         | Project Name:   | Project Address:   | as instructed.  |
| Automatic Fault Detectio                                 | Project Name:   | Project Address:  |  |   |
| Project Name:  | Project Address:                                      | System Name or Identification/Tag:  | System Name or Identification/Tag:                           | Sections B. Functional Testing for Air Handling Units   |
| Project Address:   | System Name or Identification/Tag:                    | System Name or Identificationy rag.   |  | This section consists of check boxes and yes or no questions arranged by individual test. Check each box or circle  |
| System Name or Identification/Tag:                       |   |   | D. Testing Results   | the correct answer for each specific test or line item.   |
|  |   | C. Functional Testing for Zone 1  | Test passes if all applicable answers are yes                | Sections C. Functional Testing for Zone Terminal Units  |
| Note: Submit one Certificate                             | Step 3: Valve/actuator fault                          | Testing shall be performed on one of e<br>shall be tested.                              |  | This section consists of check boxes and yes or no questions arranged by individual test. Check each box or circle  |
| demonstrate compliance.                                  | a. From the control system wo                         | Step 1: Sensor drift/failure  | E. Evaluation  | the correct answer for each specific test or line item.   |
| Intent: Verify that th                                   | b. Disconnect power to the act                        |   | PASS: All Construction Inspection res                        |   |
|  | c. Reconnect power to the act                         | a. Disconnect the tubing to the diff  |  | Section D. Testing Results  |
| A. Construction Inspecti                                 | d. Verify that the control syste                      | b. Verify that control system detect  |  | This section consists of check boxes for each test procedure. Complete check boxes as instructed.   |
| 1. Instrumentation to perfo                              | e. From the control system wo                         | c. Reconnect the sensor and verify  |  | Section E Evolution   |
| a. No instrumentati                                      | f. Disconnect power to the act                        | d. Verify that the control system do  |  | Section E. Evaluation<br>Check the appropriate box as instructed.   |
| 2. Installation<br>The functional te                     | g. Reconnect power to the act                         | Step 2: Damper/actuator fault – damp  |  | check the appropriate box as instructed.  |
| a. installation check                                    | · · ·   | a. Command the damper to be full  |  | Declaration Statements of Acceptance  |
|  | h. Verify that the control syste                      |   |  | This section contains fillable fields for three declaration statements: one from the Documentation Author, one  |
| B. Functional Testing for<br>Testing of each AHU with FI | Step 4: Inappropriate simultaneo                      | b. Disconnect the actuator to the d<br>Adjust the cooling setpoint so th                |  | from the Field Technician, and one from the Responsible Person. Each area contains a combination of check   |
| Step 1: Sensor Drift/Failure                             | a. From the control system wo<br>workstation          | c. minimum position. Verify that th   |  | boxes and data entry requirements, including signature; date; and license number. Complete check boxes and<br>enter data as instructed.   |
| a. Disconnect outside air                                | From the control system wo                            | d. Reconnect the actuator and rest  |  | enter data as instructed.   |
| b. Verify that the FDD sy:                               | From the control system wo                            | Step 3: Damper/actuator fault – dam   |  | The Documentation Author is the person completing the form. The Field Technician is responsible for performin   |
| c. Connect OAT sensor to                                 | c. workstation  |   |  | and documenting the results of the acceptance procedures on the Certificate of Acceptance forms. The Field  |
| · · · · · · · · · · · · · · · · · · ·                    |   |   |  | Technician must sign the Certificate of Acceptance to certify that the information he or she provides on the  |
| d. Verify that FDD indicat                               |   | b. Disconnect the actuator to the d   |  | Certificate of Acceptance is true and correct. It is important to note that the Field Technician is not required to   |
| Step 2: Damper/Actuator F                                |   | c. Set the cooling setpoint below the fault   |  | have a contractor's, architect's or engineer's license. A Responsible Person is eligible under Division 3 of the<br>Business and Professions code in the applicable classification to take responsibility for the scope of work |
| a. From the control syste                                |   | d. Reconnect the actuator and rest  |  | specified by the Certificate of Acceptance document. The Responsible Person can also perform the field testing  |
| b. Disconnect power to t                                 |   | Step 4: Valve/actuator fault (For syste   |  | and verification work, and if this is the case the Responsible Person must complete and sign both the Field   |
| c. Reconnect power to th                                 |   |   |  | Technician's signature block and the Responsible Person's signature block on the Certificate of Acceptance form   |
| d. Verify that the control                               |   | a. Command the reheat coil valve t  |  | The Responsible Person assumes responsibility for the acceptance testing work performed by the Field  |
| e. From the control syste                                |   | <ul> <li>Disconnect power to the actuate<br/>to command the valve closed. Ve</li> </ul> |  | Technician agent or employee.   |
| f. Disconnect power to t                                 |   | c. Reconnect the actuator and rest  |  |   |
| g. Reconnect power to th                                 |   | Step 5: Feedback loop tuning fault (un  |  |   |
| h. Verify that the control                               |   | Set the integral coefficient of the   |  |   |
| L  |   | simulate a call for cooling.  |  |   |
|  |   | b. The damper cycles continuously   |  |   |
|  |   | c. Reset the integral coefficient of  |  |   |
|  |   | Step 6: Disconnected inlet duct   |  |   |
|  |   | a. From the control system worksta  |  |   |
|  |   | b. Disconnect power to the actuato  |  |   |
|  |   | · · ·   |  |   |
|  |   | c. Reset the space temperature set  |  |   |
| CA Building Energy Efficience                            |   |   |  |   |
|  | CA Building Energy Efficiency Star                    |   |  |   |
|  |   | CA Building Energy Efficiency Standard  |  |   |
|  |   |   | CA Building Energy Efficiency Standards - 24                 |   |
|  |   |   |  | CA Building Energy Efficiency Standards - 20132016 Nonresidential Compliance  |
|  |   |   |  |   |



## NA7.5.14 Thermal Energy Storage (TES) System Acceptance



| CEC-NRCA-MCH-15-A (Revised MMYY)<br>CERTIFICATE OF ACCEPTANCE  |              | Cres or a                               | A ENERGY COMMISSION<br>NRCA-MCH-15-A |
|--|--------------|---|--------------------------------------|
| Thermal Energy Storage (TES) System Acceptance   |              |   | (Page 1 of 4)                        |
| Project Name:  | Enforcemen   | nt Agency:                              | Permit Number:                       |
| Project Address:   | City:        |   | Zip Code:                            |
| System Name or Identification/Tag:   | System Loc   | ation or Area Served:                   |                                      |
| Note: Submit one Certificate of Acceptance for each that must demonstrate compliance.                        |              | Enforcement Agency Use: Checked by/Date |                                      |
| Intent: Verify proper operation of distribu  | ted energy   | y storage TES systems.                  |                                      |
| A. Construction Inspection   |              |   |                                      |
| 1. Supporting documentation needed to perform te   | est includes | :                                       |                                      |
| a. Construction documents (plans, drawings, e  | quipment s   | chedule, etc.)                          |                                      |
| b. Approved submittals (for chillers, storage ta   | nks, contro  | ls)                                     |                                      |
| c. Copy of manufacturers' product literature   |              |   |                                      |
| d. Copy of Title 24 code   |              |   |                                      |
| e. Copy of pertinent appendices to Title 24  |              |   |                                      |
| B. System Installation Information   |              |   |                                      |
| The following information for both the chiller and ti<br>System parameters. Information is likely to be foun | -            |   | document the key TES                 |
| 1. Chiller(s)  |              |   |                                      |
| Brand and Model:   |              |   |                                      |
| Type (Centrifugal, Reciprocating, etc) and (qty)   |              |   |                                      |
| Heat rejection type (air, water, other)  |              |   |                                      |
| Charge mode capacity (tons) @ avg. fluid temp.   |              |   |                                      |
|  |              |   |                                      |
| Discharge mode capacity (tons) @ temp.   |              |   |                                      |
| Discharge mode capacity (tons) @ temp.<br>Discharge mode efficiency (kW/ton or EER)@<br>design ambient temp. |              |   |                                      |
| Discharge mode efficiency (kW/ton or EER)@   |              |   |                                      |



|   | THERMAL ENERGY STORAGE (TES) S<br>CEC-NRCA-MCH-15-A (Revised MMYY)  | GYSTEM ACCEPTANCE<br>CALIFORNIA ENER   | GY COMMISSION         |  |  |
|---|---|--|-----------------------|--|--|
| HERMAL ENERGY STORAGE (<br>C-NRCA-MCH-15-A (Revised MMYY)                                   | CERTIFICATE OF ACCEPTANCE   |  | NRCA-MCH-15-          |  |  |
| ERTIFICATE OF ACCEPTANCE  | Thermal Energy Storage (TES) System Acceptance (Page 2 of   |  |                       |  |  |
| ermal Energy Storage (TES) System Accep   | Project Name:   | Enforcement Agency:  | Permit Number:        |  |  |
| ect Name:   | Project Address:  | City:  | Zip Code:             |  |  |
| ect Address:  | System Name or Identification/Tag:  | System Location or Area Served:  |                       |  |  |
| tem Name or Identification/Tag:   |   |  |                       |  |  |
|   |   |  |                       |  |  |
| te: Submit one Certificate of Acceptance  | 2. Storage  |  |                       |  |  |
| at must demonstrate compliance.   | The an Orithment Male   | Type (Check):  |                       |  |  |
|   | Ice-on-Coil Internal Melt     Ice-on-Coil External Melt   | Chilled Water Brine (or chilled water wa | (محمد المالية المراجع |  |  |
| ntent: Verify proper operation of a   | Encapsulated (e.g. ice balls)   | Brine (or chilled water w     Eutectic Salt  | with additives)       |  |  |
|   | □ Ice Harvester   | Clathrate Hydrate Slurry   | (CHS)                 |  |  |
| Construction Inspection   |   | □ Cryogenic  | ()                    |  |  |
| Supporting documentation needed to per  | Other Phase Change Material (e.g. paraffin)   | Other (specify:  |                       |  |  |
| a. Construction documents (plans, drav  | Brand and Model   |  |                       |  |  |
| b. Approved submittals (for chillers, sto   |   |  |                       |  |  |
| c. Copy of manufacturers' product liter   | Number of tanks   |  |                       |  |  |
| d. Copy of Title 24 code  | If custom tanks used, specify height/width/depth  |  |                       |  |  |
| e. Copy of pertinent appendices to Title  | or height/diameter  |  |                       |  |  |
|   | Storage capacity per tank (ton-hours) @   |  |                       |  |  |
| System Installation Information   | entering/leaving temp. and hours discharged   |  |                       |  |  |
| he following information for both the chille<br>stem parameters. Information is likely to l | Storage rate (tons) @ flow rate (gpm) per tank  |  |                       |  |  |
| Chiller(s)  | Minimum charging temp. based on chiller and   |  |                       |  |  |
| rand and Model:   | tank selections:  |  |                       |  |  |
| ype (Centrifugal, Reciprocating, etc) and (q  | Discharge rate (tons) @ entering/leaving temp.<br>and hours discharged:   |  |                       |  |  |
| leat rejection type (air, water, other)   |   |  | ,                     |  |  |
| harge mode capacity (tons) @ avg. fluid te  | C. Functional Testing   |  | Results               |  |  |
| ischarge mode capacity (tons) @ temp.   | Step 1: TES System Design Verification  |  |                       |  |  |
| ischarge mode efficiency (kW/ton or EER)  |   | information, which verifies proper installation of the TE  | S System              |  |  |
| esign ambient temp.   | components, consistent with system design expectat<br>a. Chiller(s) start-up procedure has been complete  |  | Y/N                   |  |  |
| narge mode efficiency @ nighttime design  | b. System fluid test and balance has been complete  |  | Y/N                   |  |  |
| nbient temp. (kW/ton or EER)  |   | teu  | Y/N                   |  |  |
| uid type and percentage (nameplate)   | C. Air separation and purge has been completed     d. Fluid (e.g. glycol) has been verified at the concentration and type indicated on the design documents   |  |                       |  |  |
|   |   |  | Y/N<br>Y/N            |  |  |
|   |   | -  |                       |  |  |
|   |   | -  | Y/N<br>Y/N            |  |  |
|   | g. The system is in a partial charge state in prepar  |  | Y/N                   |  |  |
|   | h.       Schedule of operation has been activated as designed         i.       Mode documentation describes the state of system components in each mode of operation         Step 2: TES System Controls and Operation Verification |  |                       |  |  |
|   |   |  |                       |  |  |
|   |   |  |                       |  |  |
|   |   | a. The TES system and the chilled water plant is controlled and monitored by an EMS.   |                       |  |  |
|   | a. The TES system and the chilled water plant is co   | ontrolled and monitored by an EMS.   | 🗆 Pass / 🗆 Fail       |  |  |
|   | a. The TES system and the chilled water plant is co<br>The system has controls in place that are config<br>b.   |  |                       |  |  |

© 2016 NEMIC

| NOMIC  |  |
|--|--|
| NATIONAL ENERGY MANAGEMENT INSTITUTE COMMITTEE |  |

|  | _   |   |  |   |                |      |       |
|--|---|---|--|---|----------------|------|-------|
|  |   |   | OF CALIFORNIA  |   |                |      |       |
|  | STATE OF CALIFORNIA   | THERMAL ENERGY STORAGE (TES) SYSTEM ACCEPTANCE<br>[CEC-NRCA-MCH-15-A (Revised MWYY) CALIFORNIA ENERGY<br>CALIFORNIA ENERGY  |  |   |                |      |       |
| STATE OF CALIFORNIA  | THERMAL ENERGY STORAGE (TES                                 | ·   | IFICATE OF ACCEPTANCE  | CALIFORNIA ENER   | NRCA-MCH-15-A  |      | -15-4 |
| THERMAL ENERGY STORAGE (TI<br>CEC-NRCA-MCH-15-A (Revised MM/YY)                                    | CEC-NRCA-MCH-15-A (Revised MM/YY) CERTIFICATE OF ACCEPTANCE |   | mal Energy Storage (TES) System Acceptance   | •   | (Page 3 of 4)  |      |       |
| CERTIFICATE OF ACCEPTANCE  | Thermal Energy Storage (TES) System Acceptance              | Project N   |  | Enforcement Agency:   | Permit Number: |      | ,     |
| Thermal Energy Storage (TES) System Accepta  | Project Name:   | Burlant 4   | Project Address: City:   |   | Zip Code:      |      |       |
| Project Name:  | Project Address:  |   |  |   |                |      |       |
| Project Address:   | System Name or Identification/Tag:                          | System Name or identification/Tag: System Location or Area Served:  |  |   |                |      |       |
| System Name or Identification/Tag:   |   |   |  |   |                |      |       |
|  |   |   | For scheduled operation, note the times when the   | system will be in each mode of operation below              | Pass           | Fail | N/A   |
|  | 2. Storage  |   |  |   |                |      |       |
| Note: Submit one Certificate of Acceptance for<br>that must demonstrate compliance.                |   | Storage/charge mode. Manually select storage mode. Verify that the TES system stores energy.<br>c. If scheduled, force the time between(am/pm) and(am/pm). Verify that the TES system |  |   |                |      |       |
| that must demonstrate compliance.  | Ice-on-Coil Internal Melt                                   |   | stores energy.   |   |                |      |       |
| Intent: Verify proper operation of dist  | Ice-on-Coil External Melt                                   |   |  |   |                |      |       |
|  | Encapsulated (e.g. ice balls)                               |   | d. End of charge signal. Simulate 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 is stopped.  |   |                |      |       |
| A. Construction Inspection   | Ice Harvester   |   |  | nually select storage only discharge mode. Verify that      |                |      |       |
| 1. Supporting documentation needed to perfor   | Ice Slurry  |   | e. the TES system starts discharging with the compressors off. Return to the off/secured mode. If scheduled, force the time to be between(am/pm) and(am/pm) and verify that the storage starts discharging with the compressors off.   |   |                |      |       |
|  | Other Phase Change Material (e.g. paraffin)                 |   |  |   |                |      |       |
| a. Construction documents (plans, drawin   | Brand and Model   | 1   |  |   |                |      |       |
| b. Approved submittals (for chillers, stora  |   |   | Mechanical cooling only mode. Generate a call for  | or cooling. Manually select mechanical cooling only         |                |      |       |
| c. Copy of manufacturers' product literatu   | Number of tanks   |   | mode and verify that the storage does not discharge and the cooling load is met by the compressor<br>f. only. Return to the off/secured mode. If scheduled, force the time to be between(am/pm) and<br>(am/pm) and verify that the storage does not discharge and the cooling load is met by the |   |                |      |       |
| d. Copy of Title 24 code   | If custom tanks used, specify height/width/depth            | f.  |  |   |                |      |       |
| e. Copy of pertinent appendices to Title 2   | or height/diameter  |   |  |   |                |      |       |
|  | Storage capacity per tank (ton-hours) @                     |   | compressor(s) only.<br>Discharge and mechanical cooling mode. Conesa   | to a call for cooling. Manually colort discharge and        |                |      |       |
| B. System Installation Information   | entering/leaving temp. and hours discharged                 |   | Discharge and mechanical cooling mode. Generate a call for cooling. Manually select discharge and<br>mechanical cooling mode and verify that the TES system discharges with the chiller(s) sharing the   |   |                |      |       |
| The following information for both the chiller c<br>System parameters. Information is likely to be | Storage rate (tons) @ flow rate (gpm) per tank              |   |  | ed, force the time to be between(am/pm) and                 |                |      |       |
| 1. Chiller(s)  | Minimum charging temp. based on chiller and                 |   | · · · · · · · · · · · · · · · · · · ·  | starts discharging with the compressor(s) sharing the load. |                |      |       |
| Brand and Model:   | tank selections:  |   | Off/storage-secured mode. Manually select the off/storage-secured mode and verify that the storage does not discharge and all compressors are off, regardless of the presence of calls for cooling. If scheduled, force the time to be between(am/pm) and(am/pm) and verify that the storage     |   |                |      |       |
|  | Discharge rate (tons) @ entering/leaving temp.              | I h   |  |   |                |      |       |
| Type (Centrifugal, Reciprocating, etc) and (qty  | and hours discharged:                                       | 1   |  |   |                |      |       |
| Heat rejection type (air, water, other)  |   | · · ·   | does not discharge and all compressors are off, re   |   |                |      |       |
| Charge mode capacity (tons) @ avg. fluid temp  | C. Functional Testing                                       |   |  | le have been made by the system designer, verify            |                |      |       |
|  | Step 1: TES System Design Verification                      |   | cooling and entering the charge mode either mar  | active cooling load, simulated by generating a call for     |                | _    |       |
| Discharge mode capacity (tons) @ temp.   | The installing contractor(s) shall certify the followi      |   | If the system disallows this mode of operation, ve   |   |                |      |       |
| Discharge mode efficiency (kW/ton or EER)@<br>design ambient temp.                                 | components, consistent with system design expec             |   | discontinued while an active cooling load is prese   |   |                |      |       |
| Charge mode efficiency @ nighttime design  | a. Chiller(s) start-up procedure has been compl             |   | and a prese  |   |                |      |       |
| ambient temp. (kW/ton or EER)  | b. System fluid test and balance has been comp              | D D   | aluation (check one)   |   |                |      |       |
| Fluid type and percentage (nameplate)  | c. Air separation and purge has been complete               | · · ·   |  |   |                |      |       |
| ······································   | d. Fluid (e.g. glycol) has been verified at the cor         |   | ASS: Construction Inspection responses are comp  | plete and all applicable tests in step 2 pass.              |                |      |       |
|  | e. The TES system has been fully charged at lea             |   |  |   |                |      |       |
| •  | f. The system has been partially discharged at              |   |  |   |                |      |       |
|  | g. The system is in a partial charge state in prep          |   |  |   |                |      |       |
|  | h. Schedule of operation has been activated as              |   |  |   |                |      |       |
|  | i. Mode documentation describes the state of                |   |  |   |                |      |       |
|  | Step 2: TES System Controls and Operation Verifi            |   |  |   |                |      |       |
|  | a. The TES system and the chilled water plant is            | L   |  |   |                |      |       |
|  | The parton has controls in place that are con               |   |  |   |                |      |       |

#### CA Building Energy Efficiency Standards - 20132016

CA Building Energy Efficiency Standards - 20132016 Non

The system has controls in place that are con

manually select each mode of

b.

CA Building Energy Efficiency Standards - 20132016 Nonresidential Compliance

<Date>



|   |  |  | CERTIFICATE OF ACCEPTANCE – USER INSTRUCTIONS NRCA-MCH-15-A   |
|---|--|--|---|
|   |  | STATE OF CALIFORNIA<br>THERMAL ENERGY STORAGE (TI  | Thermal Energy Storage (TES) System Acceptance (Page 1 of 1)  |
|   | STATE OF CALIFORNIA<br>THERMAL ENERGY STORAGE      | CEC-NRCA-MCH-15-A (Revised MM/YY)  |   |
| STATE OF CALIFORNIA<br>THERMAL ENERGY STORA | CEC-NRCA-MCH-15-A (Revised MMYY)                   | CERTIFICATE OF ACCEPTANCE  | NRCA-MCH-15-A User Instructions   |
| CEC-NRCA-MCH-15-A (Revised MMYY)            | CERTIFICATE OF ACCEPTANCE                          | Thermal Energy Storage (TES) System Accepta  |   |
| CERTIFICATE OF ACCEPTANCE                   | Thermal Energy Storage (TES) System Acce           | Project Name:  | Section A. Construction Inspection  |
| Thermal Energy Storage (TES) System         | Project Name:                                      | Project Address:   | This pre-test section consists of check boxes and data entry requirements. Complete check boxes and enter   |
| Project Name:                               | Project Address:                                   |  | data as instructed.   |
| Project Address:                            | System Name or Identification/Tag:                 | System Name or Identification/Tag:   |   |
| System Name or Identification/Tag:          |  |  | Section 8. Functional Testing   |
|   |  | For scheduled operation, note the times w  | This section consists of check boxes and yes or no questions arranged by individual test. Check each box or<br>circle the correct answer for each specific test or line item.   |
| Note: Submit one Certificate of Accept      | 2. Storage   | Storage/charge mode. Manually select st  | circle the correct answer for each specific test of fine item.  |
| that must demonstrate compliance.           |  | <ul> <li>c. If scheduled, force the time between</li> </ul>  | Section C. Testing Results  |
|   | Ice-on-Coil Internal Melt                          | stores energy.   | This section consists of check boxes for each test procedure. Complete check boxes as instructed.   |
| Intent: Verify proper operatio              | Ice-on-Coil External Melt                          | End of charge signal. Simulate a full stora  |   |
|   | Encapsulated (e.g. ice balls)                      | recommended end of charge output sens  | Section D. Evaluation   |
| A. Construction Inspection                  | Ice Harvester                                      | Discharge mode. Generate a call for cool   | Check the appropriate box as instructed.  |
| 1. Supporting documentation needed          | Ice Slurry Other Phase Change Material (e.g. paraf | the TES system starts discharging with th  |   |
| a. Construction documents (plans            |  | scheduled, force the time to be between  | Declaration Statements of Acceptance  |
| b. Approved submittals (for chille          | Brand and Model                                    | starts discharging with the compressors of<br>Mechanical cooling only mode. Generate   | This section contains fillable fields for three declaration statements: one from the Documentation Author, one  |
| c. Copy of manufacturers' produc            | Number of tanks                                    | mode and verify that the storage does no   | from the Field Technician, and one from the Responsible Person. Each area contains a combination of check<br>boxes and data entry requirements, including signature; date; and license number. Complete check boxes and |
| d. Copy of Title 24 code                    | If custom tanks used, specify height/width         | f. only. Return to the off/secured mode. If :  | boxes and data entry requirements, including signature, date, and license number. Complete check boxes and<br>enter data as instructed.   |
| e. Copy of pertinent appendices t           | or height/diameter                                 | (am/pm) and verify that the storage c  | enter data as instructed.   |
| · · · · · · · · · · · · · · · · · · ·       | Storage capacity per tank (ton-hours) @            | compressor(s) only.  | The Documentation Author is the person completing the form. The Field Technician is responsible for   |
| B. System Installation Information          | entering/leaving temp. and hours discharg          | Discharge and mechanical cooling mode  | performing and documenting the results of the acceptance procedures on the Certificate of Acceptance forms.   |
| The following information for both the      | Storage rate (tons) @ flow rate (gpm) per          | g. In the second | The Field Technician must sign the Certificate of Acceptance to certify that the information he or she provides   |
| System parameters. Information is like      | Minimum charging temp. based on chiller            | (am/pm) and verify that the storage s  | on the Certificate of Acceptance is true and correct. It is important to note that the Field Technician is not  |
| 1. Chiller(s)                               | tank selections:                                   | Off/storage-secured mode. Manually sel   | required to have a contractor's, architect's or engineer's license. A Responsible Person is eligible under Division   |
| Brand and Model:                            | Discharge rate (tons) @ entering/leaving t         | does not discharge and all compressors a h.  | 3 of the Business and Professions code in the applicable classification to take responsibility for the scope of   |
| Type (Centrifugal, Reciprocating, etc)      | and hours discharged:                              | scheduled, force the time to be between  | work specified by the Certificate of Acceptance document. The Responsible Person can also perform the field   |
| Heat rejection type (air, water, other)     |  | does not discharge and all compressors a   | testing and verification work, and if this is the case the Responsible Person must complete and sign both the   |
| Charge mode capacity (tons) @ avg. fl       | C. Functional Testing                              | Charge plus cool mode. If provisions for t   | Field Technician's signature block and the Responsible Person's signature block on the Certificate of<br>Acceptance form. The Responsible Person assumes responsibility for the acceptance testing work performed b     |
| Discharge mode capacity (tons) @ ter        | Step 1: TES System Design Verification             | that the tank(s) can be charged while sen<br>i. cooling and entering the charge mode eit   | the Field Technician agent or employee.   |
| Discharge mode efficiency (kW/ton or        | The installing contractor(s) shall certify the     | If the system disallows this mode of oper  |   |
| design ambient temp.                        | components, consistent with system desig           | discontinued while an active cooling load  |   |
| Charge mode efficiency @ nighttime (        | a. Chiller(s) start-up procedure has bee           | <u> </u>   |   |
| ambient temp. (kW/ton or EER)               | b. System fluid test and balance has be            | D. Evaluation (check one)  |   |
| Fluid type and percentage (nameplate        | c. Air separation and purge has been co            | · · ·  |   |
|   | d. Fluid (e.g. glycol) has been verified a         | PASS: Construction Inspection responses a  |   |
|   | e. The TES system has been fully charge            |  |   |
|   | f. The system has been partially discha            |  |   |
|   | g. The system is in a partial charge state         |  |   |
|   | h. Schedule of operation has been activ            |  |   |
|   | i. Mode documentation describes the                |  |   |
|   | Step 2: TES System Controls and Operatio           |  |   |
|   | a. The TES system and the chilled water            |  |   |
|   | The system has controls in place that              |  |   |
|   | b.  manually select each                           |  |   |
|   | · · · · · · · · · · · · · · · · · · ·              |  |   |
|   |  |  |   |
| CA Building France Officiant Standard       |  |  |   |
| CA Building Energy Efficiency Standards - 4 |  |  |   |
|   | CA Building Energy Efficiency Standards - 2013     |  |   |
|   |  | CA Building Energy Efficiency Standards - 20132016   |   |
|   |  |  |   |

<Date>



The latest version of the Mechanical Acceptance Forms can be downloaded from the CEC website at <u>http://www.energy.ca.gov/2015publications/CEC-400-</u> 2015-033/appendices/forms/NRCA/



## RECERTIFICATION



### Next Steps

- 1. Download (by double clicking on the image) and save the document to your local folder
- 2. Complete the 2016 Recertification Statement. The document should be signed electronically. If not, you will need to make a paper copy and rescan the paper copy before emailing it. NEMIC will <u>not</u> accept paper copies of the document.
- 3. Email the completed document to <u>administrator@attcp.org</u>.

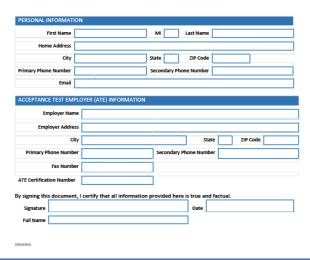


#### 2016 Mechanical Acceptance Test Employer Recertification Statement

To be recertified as a NEMIC-certified Mechanical Acceptance Test Employer you must complete this form in its entirety, electronically sign and date it and email it to <u>administrator@attcp.org</u>.

By checking this checkbox I. \_\_\_\_\_\_ hereby acknowledge that I have viewed the NEMIC ATTCP webinar entitled California 2016 Building Energy Efficiency Standards for Nonresidential Buildings – Notable Changes to the 2013 Version and am familiar with the requirements of the California 2016 Building Energy Efficiency Standards as they pertain to mechanical acceptance testing.

By checking this checkbox l, hereby acknowledge that I meet all qualifications and requirements as for initial certification.





# Thank you!