AHU & ZONE TERMINAL FDD

| Project Name and A | ddress | Authority Having J | Authority Having Jurisdiction | |
|---------------------------|--------------------|-------------------------------|-------------------------------|--|
| Name: Project Name | | Enforcement Agency | Enforcement Agency: Agency | |
| Address: Project Address | | Permit Number: Pern | Permit Number: Permit Number | |
| City, Zip: City, Zip Code | | Permit Application Date: Date | | |
| | | | | |
| Building: Enter Value | Floor: Enter Value | Room: Enter Value | Control/tag: Value | |

| Construction inspection and functional testing complyDoes not comply | Date Submitted to AHJ: Date |
|---|-----------------------------|

Intent:

Verify that the system detects common faults in air handling units and zone terminal units. Reference NRCC-MCH-E for nonresidential (including nonresidential spaces in high-rise multifamily) building permits or LMCC-MCH-E for nonresidential spaces in low-rise multifamily building permits or LMCC-PRF-E or NRCC-PRF-E for the performance path. Submit one Certificate of Acceptance for each system that must demonstrate compliance. References: §120.2(i), §120.5(a)12, §160.3(a)2H, §160.3(d)1L, and NA7.5.12.

Table A: Construction Inspection

Prior to functional testing, verify and document all of the following:

| Step | Entry | Item | Code Reference |
|------|-----------|--|-------------------|
| 1.0 | Pass Fail | Verify on the submittal documents or sensor specifications that locally installed supply air, outside air, and return air (if applicable) temperature sensors have an accuracy of ±2°F over the range of 40°F to 80°F. | NA7.5.12.1(a) |

Table B-1: Functional Testing for Air Handling Unit Economizers

Perform the following test for each AHU with FDD controls (§120.2(i)7 or §160.3(a)2Hvii):

| Step | Check or Status | Functional Test | Code Reference |
|------|--------------------|--|---------------------------------|
| 1.0 | Pass Fail N/A | If applicable, bypass alarm delays to ensure that faults generate alarms immediately. (Pass, Fail, N/A) | NA7.5.12.2(a) Step 1 |
| 2.0 | No Entry | Sensor Failure | NA7.5.12.2(b) |
| 2.1 | Pass Fail | Disconnect local supply air temperature (SAT) sensor from unit controller and verify that the FDD system reports a fault. | NA7.5.12.2(b) Step 1, Step 2 |
| 2.2 | ☐ Pass ☐ Fail | Connect SAT sensor to the unit controller and verify that FDD indicates normal system operation and clears all faults and alarms. | NA7.5.12.2(b) Step 3, Step 4 |
| 2.3 | Pass Fail N/A | If the outside air temperature (OAT) sensor is local, then disconnect the local OAT from the unit controller and verify that the FDD system reports a fault. (Pass, Fail, N/A) | NA7.5.12.2(b) Step 5, Step 6 |

| Step | Check or Status | Functional Test | Code Reference |
|------|--------------------|---|-------------------------------------|
| 2.4 | Pass Fail N/A | If Step 2.3 performed, then connect the local OAT sensor to the unit controller and verify that FDD indicates normal system operation and clear all faults and alarms. (Pass, Fail, N/A) | NA7.5.12.2(b) Step 7, Step 8 |
| 3.0 | No Entry | Inappropriate Economizing | NA7.5.12.2(c) |
| 3.1 | Pass Fail | Override the operating state to occupied heating mode by overriding zone thermostat(s) to create a heating demand and overriding the OAT sensor below the low limit lockout. | NA7.5.12.2(c) Step 1 |
| 3.2 | ☐ Pass ☐ Fail | From the control system workstation, override the economizer dampers to 100 percent outdoor air and verify that a fault is reported at the control workstation. | NA7.5.12.2(c) Step 2, Step 3 |
| 3.3 | ☐ Pass ☐ Fail | Remove the economizer damper override and verify that the control system indicates normal system operation. | NA7.5.12.2(c) Step 4 |
| 3.4 | Pass Fail | Remove all overrides and clear all faults and alarms. | NA7.5.12.2(c) Step 5 |
| 3.5 | ☐ Pass ☐ Fail | Force the operating stat to economizer-only cooling mode by adjusting the zone thermostat(s) to create a cooling demand then overriding the OAT sensor so that free cooling is available. | NA7.5.12.2(c) Step 6 |
| 3.6 | Pass Fail | From the control system workstation, override the economizer dampers to zero percent outdoor air and verify that a fault is reported at the control workstation. | NA7.5.12.2(c) Step 7, Step 8 |
| 3.7 | ☐ Pass ☐ Fail | Remove the economizer damper override and verify that the control system indicates normal system operation. Remove all overrides and clear all faults and alarms. | NA7.5.12.2(c) Step 9, Step 10 |
| 4.0 | Pass Fail N/A | If Step 1 performed, then reinstate alarm delays. (Pass, Fail, N/A) | NA7.5.12.2(d) Step 1 |
| 5.0 | Pass Fail | Check pass if Functional Test Table B-1 passes on Steps 1 through 4. | N/A |

Table B-2: Functional Testing for Air Handling Unit Valves

Perform the following test for each AHU with FDD controls (§120.2(i)7 or §160.3(a)2Hvii):

| | Check or | 61 Caci 7 (10 Will 1 22 Controls (3120.2(1)) 61 3100.3 | Code |
|------|---------------------------|--|--------------------------|
| Step | Status | Functional Test | Reference |
| 1.0 | Pass Fail N/A | If applicable, bypass alarm delays to ensure that faults generate alarms immediately. (Pass, Fail, N/A) | NA7.5.12.3(a) Step1 |
| 2.0 | No Entry | Valve/actuator Fault | NA7.5.12.3(b) |
| 2.1 | ☐ Pass ☐ Fail | Override the operating state to occupied cooling mode by overriding zone thermostat(s) to create a cooling demand and overriding the OAT sensor to 90°F. | NA7.5.12.3(b) Step 1 |
| 2.2 | ☐ Pass ☐ Fail | From the control system workstation, override the heating coil valves to the full open position (100 percent heating mode). | NA7.5.12.3(b) Step 2 |
| 2.3 | ☐ Pass ☐ Fail | Verify flow through the valve by differential temperature or differential pressure method. | NA7.5.12.3(b) Step 3 |
| 2.4 | Pass Fail | Verify that a fault is reported at the control workstation. | NA7.5.12.3(b) Step 4 |
| 2.5 | Pass Fail | Remove the heating coil valve override and verify that the control system indicates normal system operation. | NA7.5.12.3(b) Step 5 |
| 2.6 | Pass Fail | Remove all overrides and clear all faults and alarms. | NA7.5.12.3(b) Step 6 |
| 2.7 | ☐ Pass ☐ Fail | Override the operating state to occupied heating mode by overriding zone thermostat(s) to create a heating demand and overriding the OAT sensor to 40°F. | NA7.5.12.3(b) Step 7 |
| 2.8 | ☐ Pass ☐ Fail | From the control system workstation, override the cooling coil valve to the full open position (100 percent cooling mode). | NA7.5.12.3(b) Step 8 |
| 2.9 | Pass Fail | Verify flow through the valve by differential temperature or differential pressure method. | NA7.5.12.3(b) Step 9 |
| 2.10 | ☐ Pass ☐ Fail | Verify that a fault is reported at the control workstation. | NA7.5.12.3(b) Step 10 |
| 2.11 | Pass Fail | Remove the cooling coil valve override and verify that the control system indicates normal system operation. | NA7.5.12.3(b) Step 11 |
| 2.12 | Pass Fail | Remove all overrides and clear all faults and alarms. | NA7.5.12.3(b) Step 12 |
| 3.0 | ☐ Pass ☐ Fail ☐ N/A | If Step 1 performed, then reinstate alarm delays. (Pass, Fail, N/A) | NA7.5.12.3(c) Step 1 |
| 4.0 | ☐ Pass ☐ Fail | Check pass if Functional Test Table B-2 passes on Steps 1 through 3. | N/A |

Table B-3: Functional Testing for Zone Terminal Units

Perform the following test for each VAV box. A minimum of five percent of all terminal boxes (all

types together) must be tested (§120.2(i)7 or §160.3(a)2Hvii):

| | Check or | Functional Tast | Code |
|------|------------------|---|--------------------------|
| Step | Status | Functional Test | Reference |
| 1.0 | No Entry | Sensor drift/failure | NA7.5.12.4(a) |
| 1.1 | ☐ Pass ☐ Fail | Disconnect the tubing to the differential pressure sensor of the VAV box. | NA7.5.12.4(a) Step 1 |
| 1.2 | ☐ Pass ☐ Fail | Verify that control system detects and reports the fault. | NA7.5.12.4(a) Step 2 |
| 1.3 | ☐ Pass ☐ Fail | Reconnect the sensor and verify proper sensor operation. | NA7.5.12.4(a) Step 3 |
| 1.4 | ☐ Pass ☐ Fail | Verify that the control system does not report a fault. | NA7.5.12.4(a) Step 4 |
| 2.0 | No Entry | Damper/actuator fault | NA7.5.12.4(b) |
| 2.1 | ☐ Pass ☐ Fail | Damper stuck open: Command the damper to be fully open (room temperature above setpoint). | NA7.5.12.4(b)1 Step 1 |
| 2.2 | Pass Fail | Disconnect the actuator to the damper. | NA7.5.12.4(b)1 Step 2 |
| 2.3 | ☐ Pass ☐ Fail | Adjust the cooling setpoint so that the room temperature is below the cooling setpoint to command the damper to the minimum position. Verify that the control system reports a fault. | NA7.5.12.4(b)1 Step 3 |
| 2.4 | ☐ Pass ☐ Fail | Reconnect the actuator and restore to normal operation. | NA7.5.12.4(b)1 Step 4 |
| 2.5 | ☐ Pass ☐ Fail | Damper stuck closed: Set the damper to the minimum position. | NA7.5.12.4(b)2 Step 1 |
| 2.6 | ☐ Pass ☐ Fail | Disconnect the actuator to the damper. | NA7.5.12.4(b)2 Step 2 |
| 2.7 | ☐ Pass ☐ Fail | Set the cooling setpoint below the room temperature to simulate a call for cooling. Verify that the control system reports a fault. | NA7.5.12.4(b)2 Step 3 |
| 2.8 | Pass Fail | Reconnect the actuator and restore to normal operation. | NA7.5.12.4(b)2 Step 4 |
| 3.0 | No Entry | Valve/actuator fault (For systems with hydronic reheat) | NA7.5.12.4(c) |
| 3.1 | Pass Fail | Command the reheat coil valve to (full) open. | NA7.5.12.4(c) Step 1 |

| Step | Check or Status | Functional Test | Code Reference |
|------|--------------------|---|-------------------------|
| 3.2 | ☐ Pass ☐ Fail | Disconnect power to the actuator. Set the heating setpoint temperature to be lower than the current space temperature, to command the valve closed. Verify that the fault is reported at the control workstation. | NA7.5.12.4(c) Step 2 |
| 3.3 | ☐ Pass ☐ Fail | Reconnect the actuator and restore normal operation. | NA7.5.12.4(c) Step 3 |
| 4.0 | No Entry | Feedback loop tuning fault (unstable airflow) | NA7.5.12.4(d) |
| 4.1 | ☐ Pass ☐ Fail | Set the integral coefficient of the box controller to a value 50 times the current value. | NA7.5.12.4(d) Step 1 |
| 4.2 | Pass Fail | The damper cycles continuously and airflow is unstable. Verify that the control system detects and reports the fault. | NA7.5.12.4(d) Step 2 |
| 4.3 | Pass Fail | Reset the integral coefficient of the controller to the original value to restore normal operation. | NA7.5.12.4(d) Step 3 |
| 5.0 | ☐ Pass ☐ Fail | Disconnected inlet duct : From the control system workstation, command the damper to full closed, then disconnect power to the actuator and verify that a fault is reported at the control workstation. | NA7.5.12.4(e) Step 1 |
| 6.0 | ☐ Pass ☐ Fail | Discharge air temperature sensor : Adjust zone setpoints to drive the box from dead band to full heating. | NA7.5.12.4(f) Step 1 |
| 6.1 | ☐ Pass ☐ Fail | Verify that in heating, the supply air temperature resets up to the maximum setpoint while the airflow is maintained at the dead band flow rate. | NA7.5.12.4(f) Step 2 |
| 6.2 | ☐ Pass ☐ Fail | Verify that after the supply air temperature is reset up to the maximum setpoint, the airflow rate then increases up to the heating maximum flow rate in order to meet the heating load. | NA7.5.12.4(f) Step 3 |
| 7.0 | Pass Fail | Remove all overrides, clear all faults and alarms, and return the system to normal operation. | N/A |
| 8.0 | Pass Fail | Check pass if Functional Test Table B-3 passes on Steps 1 through 7. | N/A |



| Declaration Statement | Signatory |
|--|------------------------|
| Document Author | Name |
| I assert that this Certificate of Acceptance documentation is accurate and complete. | Company Name |
| | Author Signature |
| | Date Signed |
| Acceptance Test Technician | |
| I certify the following under penalty of perjury, under the laws of the State of California: | Name |
| The information provided on this Certificate of Acceptance is true and correct. I am the person who | Company Name |
| performed the acceptance verification reported on this Certificate of Acceptance (Field Technician). The | ATT No.: ATT Cert. No. |
| construction or installation identified on this Certificate of Acceptance complies with the applicable | Title |
| acceptance requirements indicated in the plans and specifications approved by the enforcement agency | Phone |
| and conforms to the applicable acceptance requirements and procedures specified in Reference | Signature |
| Nonresidential Appendix NA7. I have confirmed that the Certificate(s) of Installation for the construction or | Date Signed |
| installation identified on this Certificate of Acceptance has been completed and signed by the responsible | |
| builder/installer and has been posted or made available with the building permit(s) issued for the building. | |
| Responsible Person | |
| I assert the following under penalty of perjury, under the laws of the State of California: | |
| I am the Field Technician, or the Field Technician is acting on my behalf as my employee or my agent and | |
| I have reviewed the information provided on this Certificate of Acceptance. I am eligible 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 | Name |
| scope of work identified on this Certificate of Acceptance and attest to the declarations in this statement. | Company Name |
| The information provided on this Certificate of Acceptance substantiates that the construction or | Lic. No.: License No. |
| installation identified on this Certificate of Acceptance complies with the acceptance requirements | Title |
| indicated in the plans and specifications approved by the enforcement agency and conforms to the | Phone |
| applicable acceptance requirements and procedures specified in Reference Nonresidential Appendix NA7. I | Signature |
| have confirmed that the Certificate(s) of Installation for the construction or installation identified on this | Date Signed |
| Certificate of Acceptance has been completed and is posted or made available with the building permit(s) | Bate Signed |
| issued for the building. I understand that a completed, signed copy of this Certificate of Acceptance shall | |
| be posted, or made available with the building permit(s) issued for the building and shall be made | |
| available to the enforcement agency for all applicable inspections. I will take the necessary steps to fulfill | |
| this requirement. I understand that a signed copy of this Certificate of Acceptance is required to be | |
| included with the documentation the builder provides to the building owner at occupancy. I will take the | |
| necessary steps to fulfill this requirement. | |