AUTOMATIC FAULT DETECTION AND DIAGNOSTICS FOR AIR HANDLING UNITS AND ZONE TERMINAL UNITS ACCEPTANCE

CERTIFICATE OF ACCEPTANCE		NRCA-MCH-13-A
Automatic Fault Detection and Diagnostics (FDD) for Air Handling Units and Zone Terminal Units Acceptance		(Page 1 of 5)
Project Name:	Enforcement Agency:	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 system that must demonstrate compliance.	Enforcement Agency Use: Checked by/Date

Intent:	*Verify that the system detects common faults in air handling units and zone terminal units.*

A. Construction Inspection

1. Instrumentation to perform test includes, but not limited to:
   a. No instrumentation is required – changes are implemented at the building automation system control station.
2. Installation:
   a. The functional testing verifies proper installation of the controls for FDD for air handling units and zone terminal units. No additional installation checks are required.

B. Functional Testing for Air Handling Units

Testing of each AHU with FDD controls shall include the following tests:	Results
Step 1: Sensor drift/failure	
a. Disconnect outside air temperature sensor from unit controller.	Yes ○ No ○
b. Verify that the FDD system reports a fault.	Yes ○ No ○
c. Connect OAT sensor to the unit controller.	Yes ○ No ○
d. Verify that FDD indicates normal system operation.	Yes ○ No ○
Step 2: Damper/actuator fault	
a. From the control system workstation, command the mixing box dampers to full open (100% outdoor air).	Yes ○ No ○
b. Disconnect power to the actuator and verify that a fault is reported at the control workstation.	Yes ○ No ○
c. Reconnect power to the actuator and command the mixing box dampers to full open.	Yes ○ No ○
d. Verify that the control system does not report a fault.	Yes ○ No ○
e. From the control system workstation, command the mixing box dampers to a full-closed position (0% outdoor air).	Yes ○ No ○
f. Disconnect power to the actuator and verify that a fault is reported at the control workstation.	Yes ○ No ○
g. Reconnect power to the actuator and command the dampers closed.	Yes ○ No ○
h. Verify that the control system does not report a fault during normal operation.	Yes ○ No ○

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Step 3: Valve/actuator fault		
a.	From the control system workstation, command the heating coil valves to full open.	Yes ◯ No ◯
b.	Disconnect power to the actuator and verify that a fault is reported.	Yes ◯ No ◯
c.	Reconnect power to the actuator and command the heating coil valve to full open.	Yes ◯ No ◯
d.	Verify that the control system does not report a fault.	Yes ◯ No ◯
e.	From the control system workstation, command the cooling coil valve to the full open position.	Yes ◯ No ◯
f.	Disconnect power to the actuator and verify that a fault is reported.	Yes ◯ No ◯
g.	Reconnect power to the actuator and command the cooling coil valve to full open.	Yes ◯ No ◯
h.	Verify that the control system does not report a fault.	Yes ◯ No ◯
Step 4: Inappropriate simultaneous heating, mechanical cooling, and/or economizing		
a.	From the control system workstation, override the heating coil valve and verify that a fault is reported at the control workstation.	Yes ◯ No ◯
b.	From the control system workstation, override the cooling coil valve and verify that a fault is reported at the control workstation.	Yes ◯ No ◯
c.	From the control system workstation, override the mixing box dampers and verify that a fault is reported at the control workstation.	Yes ◯ No ◯

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C. Functional Testing for Zone Terminal Units Testing shall be performed on one of each type of terminal unit (VAV box) in the project. A minimum of 5% of the terminal boxes shall be tested.		Results
Step 1: Sensor drift/failure		
a.	Disconnect the tubing to the differential pressure sensor of the VAV box.	Yes ◯ No ◯
b.	Verify that control system detects and reports the fault.	Yes ◯ No ◯
c.	Reconnect the sensor and verify proper sensor operation.	Yes ◯ No ◯
d.	Verify that the control system does not report a fault.	Yes ◯ No ◯
Step 2: Damper/actuator fault – damper stuck open		
a.	Command the damper to be fully open.	Yes ◯ No ◯
b.	Disconnect the actuator to the damper.	Yes ◯ No ◯
c.	Adjust the cooling set point 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.	Yes ◯ No ◯
d.	Reconnect the actuator and restore to normal operation.	Yes ◯ No ◯
Step 3: Damper/actuator fault – damper stuck closed		
a.	Set the damper to the minimum position.	Yes ◯ No ◯
b.	Disconnect the actuator to the damper.	Yes ◯ No ◯
c.	Set the cooling set point below the room temperature to simulate a call for cooling. Verify that the control system reports a fault.	Yes ◯ No ◯
d.	Reconnect the actuator and restore to normal operation.	Yes ◯ No ◯
Step 4: Valve/actuator fault (For systems with hydronic reheat)		
a.	Command the reheat coil valve to (full) open.	Yes ◯ No ◯
b.	Disconnect power to the actuator. Set the heating set point temperature to be lower than the current space temperature, to command the valve closed. Verify that the fault is reported at the control workstation.	Yes ◯ No ◯
c.	Reconnect the actuator and restore normal operation.	Yes ◯ No ◯
Step 5: Feedback loop tuning fault (unstable airflow)		
a.	Set the integral coefficient of the box controller to a value 50 times the current value. Lower the space cooling setpoint to simulate a call for cooling.	Yes ◯ No ◯
b.	The damper cycles continuously and airflow is unstable. Verify that the control system detects and reports the fault.	Yes ◯ No ◯
c.	Reset the integral coefficient of the controller to the original value to restore normal operation.	Yes ◯ No ◯
Step 6: Disconnected inlet duct		
a.	From the control system workstation, command the damper to minimum position.	Yes ◯ No ◯
b.	Disconnect power to the actuator and verify that a fault is reported at the control workstation.	Yes ◯ No ◯
c.	Reset the space temperature setpoint back to its original value.	Yes ◯ No ◯

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D. Testing Results	PASS	FAIL
Test passes if all applicable answers are yes under **Functional Testing Sections**.	○	○

E. Evaluation

☐ PASS: All **Construction Inspection** responses are complete and all **Testing Results** responses are "Pass".

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DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

1. I certify that this Certificate of Acceptance documentation is accurate and complete.

Documentation Author Name:	Documentation Author Signature:
Documentation Author Company Name:	Date Signed:
Address:	ATT Certification Identification (If applicable):
City/State/Zip:	Phone:

FIELD TECHNICIAN'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Acceptance is true and correct.
2. I am the person who performed the acceptance verification reported on this Certificate of Acceptance (Field Technician).
3. The construction or installation identified on this Certificate of Acceptance complies with 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.
4. I have confirmed that the Certificate(s) of Installation for the construction or 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.

Field Technician Name:	Field Technician Signature:	
Field Technician Company Name:	Position with Company (Title):	
Address:	ATT Certification Identification (if applicable):	
City/State/Zip:	Phone:	Date Signed:

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. 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.
2. 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 scope of work identified on this Certificate of Acceptance and attest to the declarations in this statement (responsible acceptance person).
3. The information provided on this Certificate of Acceptance substantiates that the construction or installation identified on this Certificate of Acceptance complies with the 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.
4. I have confirmed that the Certificate(s) of Installation for the construction or installation identified on this Certificate of Acceptance has been completed and is posted or made available with the building permit(s) issued for the building.
5. I will ensure 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 made available to the enforcement agency for all applicable inspections. 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.

Responsible Acceptance Person Name:	Responsible Acceptance Person Signature:	
Responsible Acceptance Person Company Name:	Position with Company (Title):	
Address:	CSLB License:	
City/State/Zip:	Phone:	Date Signed: