

Nonresidential Appendix NA7 – 2008

Appendix NA7-2008 – Acceptance Requirements for Nonresidential Buildings

NA7.1 Purpose and Scope

This appendix defines acceptance procedures that must be completed on certain controls and equipment before the installation is deemed to be in compliance with the Standards. These requirements apply to all newly installed equipment for which there are acceptance requirements in new and existing buildings. The procedures apply to nonresidential, high-rise residential and hotel/motel buildings as defined by the California Energy Commission's Energy Efficiency Standards for Nonresidential Buildings.

The purpose of the acceptance tests is to assure:

1. The presence of equipment or building components according to the specifications in the compliance documents.
2. Installation quality and proper functioning of the controls and equipment to meet the intent of the design and the Standards.

NA7.2 Introduction

Acceptance requirements are defined as implementation of targeted inspection checks and functional and performance testing to determine whether specific building components, equipment, systems, and interfaces between systems conform to the criteria set forth in the Standards and to related construction documents (plans or specifications). Acceptance requirements improve code compliance effectiveness and help meet the expected level of performance.

Prior to signing a Certificate of Acceptance the installing contractor, engineer of record or owners agent shall be responsible for reviewing the plans and specifications to assure they conform to the acceptance requirements. Persons eligible to sign the Certificate of Acceptance are those responsible for its preparation; and licensed in the State of California as a civil engineer, mechanical engineer, licensed architect or a licensed contractor performing the applicable work or a person managing work on a structure or type of work described pursuant to Business and Professions Code sections 5537, 5538, and 6737.1.

NA7.3 Responsible Party

The installing responsible party shall certify compliance with the acceptance requirements. They shall be responsible for performing data analysis, calculation of performance indices, and crosschecking results with the requirements of the Standard. They shall be responsible for issuing a Certificate of Acceptance as well as copies of all measurement and monitoring results for individual test procedures to the enforcement agency. The enforcement agency shall not release a final Certificate of Occupancy until a Certificate of Acceptance, and all applicable acceptance requirements for code compliance forms, are approved and submitted by the responsible party. A responsible party who is licensed shall record their State of California contractor's license number or their State of California professional registration license number on each Certificate of Acceptance that they issue.

The unit controller shall have the capability to manually initiate each operating mode so that the operation of compressors, economizers, fans, and heating system can be independently tested and verified.

NA7.5.11.2 Functional Testing

1. Test low airflow condition by replacing the existing filter with a dirty filter or appropriate obstruction.
2. Verify that the fault detection and diagnostics system reports the fault.
3. Verify that the system is able to verify the correct refrigerant charge.
4. Calibrate outside air, return air, and supply air temperature sensors.

NA7.5.12 Automatic fault detection and diagnostics (FDD) for air handling units and zone terminal units.

NA7.5.12.1 Functional Testing for Air Handling Units

Testing of each AHU with FDD controls shall include the following tests.

1. Sensor drift/failure:

Step 1: Disconnect outside air temperature sensor from unit controller.

Step 2: Verify that the FDD system reports a fault.

Step 3: Connect OAT sensor to the unit controller.

Step 4: Verify that FDD indicates normal system operation.

2. Damper/actuator fault:

Step 1: From the control system workstation, command the mixing box dampers to full open (100 percent outdoor air).

Step 2: Disconnect power to the actuator and verify that a fault is reported at the control workstation.

Step 3: Reconnect power to the actuator and command the mixing box dampers to full open.

Step 4: Verify that the control system does not report a fault.

Step 5: From the control system workstation, command the mixing box dampers to a full-closed position (0 percent outdoor air),

Step 6: Disconnect power to the actuator and verify that a fault is reported at the control workstation.

Step 7: Reconnect power to the actuator and command the dampers closed.

Step 8: Verify that the control system does not report a fault during normal operation.

3. Valve/actuator fault:

Step 1: From the control system workstation, command the heating and cooling coil valves to full open or closed, then disconnect power to the actuator and verify that a fault is reported at the control workstation.

4. Inappropriate simultaneous heating, mechanical cooling, and/or economizing:

Step 1: From the control system workstation, override the heating coil valve and verify that a fault is reported at the control workstation.

Step 2: From the control system workstation, override the cooling coil valve and verify that a fault is reported at the control workstation.

Step 3: From the control system workstation, override the mixing box dampers and verify that a fault is reported at the control workstation.

NA7.5.12.2 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 percent of the terminal boxes shall be tested.

1. Sensor drift/failure:

Step 1: Disconnect the tubing to the differential pressure sensor of the VAV box.

Step 2: Verify that control system detects and reports the fault.

Step 3: Reconnect the sensor and verify proper sensor operation.

Step 4: Verify that the control system does not report a fault.

2. Damper/actuator fault:**(a) Damper stuck open.**

Step 1: Command the damper to be fully open (room temperature above setpoint).

Step 2: Disconnect the actuator to the damper.

Step 3: 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.

Step 4: Reconnect the actuator and restore to normal operation.

(b) Damper stuck closed.

Step 1: Set the damper to the minimum position.

Step 2: Disconnect the actuator to the damper.

Step 3: Set the cooling setpoint below the room temperature to simulate a call for cooling. Verify that the control system reports a fault.

Step 4: Reconnect the actuator and restore to normal operation.

3. Valve/actuator fault (For systems with hydronic reheat):

Step 1: Command the reheat coil valve to (full) open.

Step 2: 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.

Step 3: Reconnect the actuator and restore normal operation.

4. Feedback loop tuning fault (unstable airflow):

Step 1: Set the integral coefficient of the box controller to a value 50 times the current value.

Step 2: The damper cycles continuously and airflow is unstable. Verify that the control system detects and reports the fault.

Step 3: Reset the integral coefficient of the controller to the original value to restore normal operation.

5. Disconnected inlet duct:

Step 1: 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.

NA7.5.13 Distributed Energy Storage DX AC Systems Acceptance Tests¹

These acceptance requirements apply only to constant or variable volume, direct expansion (DX) systems with distributed energy storage (DES/DXAC). These acceptance requirements are in addition to those for other systems or equipment such as economizers, packaged equipment, etc.