

## **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.

- o A copy of the Certificate of Acceptance shall be given to the building owner.

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## **NA7.5 Mechanical Systems Acceptance Tests**

### **NA7.5.1 Outdoor Air**

#### **NA7.5.1.1 Variable Air Volume Systems Outdoor Air Acceptance**

##### *NA7.5.1.1.1 Construction Inspection*

Prior to functional testing, verify and document the following:

- System controlling outside airflow was calibrated either in the field or factory.

##### *NA7.5.1.1.2 Functional Testing*

Step 1: If the system has an outdoor air economizer, force the economizer high limit to disable economizer control (e.g. for a fixed drybulb high limit, lower the setpoint below the current outdoor air temperature)

Step 2: Adjust supply airflow to either the sum of the minimum zone airflows or 30 percent of the total design airflow. Verify and document the following:

- Measured outside airflow reading is within 10 percent of the total ventilation air called for in the Certificate of Compliance.
- OSA controls stabilize within 5 minutes.

Step 3: Adjust supply airflow to achieve design airflow. Verify and document the following:

- Measured outside airflow reading is within 10 percent of the total ventilation air called for in the Certificate of Compliance.
- OSA controls stabilize within 5 minutes.

Step 4: Restore system to "as-found" operating conditions

#### **NA7.5.1.2 Constant Volume System Outdoor Air Acceptance**

##### *NA7.5.1.2.1 Construction Inspection*

Prior to Functional Testing, verify and document the following:

- Minimum position is marked on the outside air damper.
- The system has means of maintaining the minimum outdoor air damper position.

##### *NA7.5.1.2.2 Functional Testing*

Step 1: If the system has an outdoor air economizer, force the economizer to the minimum position and stop outside air damper modulation (e.g. for a fixed drybulb high limit, lower the setpoint below the current outdoor air temperature)

- Measured outside airflow reading is within 10% of the total ventilation air called for in the Certificate of Compliance.

### **NA7.5.2 Constant-Volume, Single-Zone, Unitary Air Conditioners and Heat Pumps**

#### **NA7.5.2.1 Construction Inspection**

Prior to Functional Testing, verify and document the following:

- Thermostat is located within the space-conditioning zone that is served by the HVAC system.
- Thermostat meets the temperature adjustment and dead band requirements of §122(b).

- Occupied, unoccupied, and holiday schedules have been programmed per the facility's schedule.
- Pre-occupancy purge has been programmed to meet the requirements of §121(c)2.

#### **NA7.5.2.2 Functional Testing**

Step 1: Disable economizer and demand control ventilation systems (if applicable).

Step 2: Simulate a heating demand during the occupied condition. Verify and document the following:

- Supply fan operates continually.
- The unit provides heating.
- No cooling is provided by the unit.
- Outside air damper is at minimum position.

Step 3: Simulate operation in the dead band during occupied condition. Verify and document the following:

- Supply fan operates continually.
- Neither heating nor cooling is provided by the unit.
- Outside air damper is at minimum position.

Step 4: Simulate cooling demand during occupied condition. Lock out economizer (if applicable). Verify and document the following:

- Supply fan operates continually.
- The unit provides cooling.
- No heating is provided by the unit.
- Outside air damper is at minimum position.

Step 5: Simulate operation in the dead band during unoccupied mode. Verify and document the following:

- Supply fan is off.
- Outside air damper is fully closed.
- Neither heating nor cooling is provided by the unit.

Step 6: Simulate heating demand during unoccupied conditions. Verify and document the following:

- Supply fan is on (either continuously or cycling).
- Heating is provided by the unit.
- No cooling is provided by the unit.
- Outside air damper is either closed or at minimum position.

Step 7: Simulate cooling demand during unoccupied condition. Lock out economizer (if applicable). Verify and document the following:

- Supply fan is on (either continuously or cycling).
- Cooling is provided by the unit.
- No heating is provided by the unit.
- Outside air damper is either closed or at minimum position.

Step 8: Simulate manual override during unoccupied condition. Verify and document the following:

- System operates in "occupied" mode.
- System reverts to "unoccupied" mode when manual override time period expires.

Step 9: Restore economizer and demand control ventilation systems (if applicable), and remove all system overrides initiated during the test.

### **NA7.5.3. Air Distribution Systems**

#### **NA7.5.3.1 Construction Inspection**

Prior to Functional Testing, verify and document the following:

- Duct connections meet the requirements of §124.
- Flexible ducts are not compressed.
- Ducts are fully accessible for testing.
- Joints and seams are properly sealed according to the requirements of §124.
- Insulation R-Values meet the minimum requirements of §124(a).
- Insulation is protected from damage and suitable for outdoor service if applicable per §124(f).

#### **NA7.5.3.2 Functional Testing**

Step 1: Perform duct leakage test per Reference Nonresidential Appendix NA2. Certify the following:

- Duct leakage conforms to the requirements of §144(k) and §149(b)1D.

Step 2: Obtain HERS Rater field verification as required by Reference Nonresidential Appendix NA1.

### **NA7.5.4 Air Economizer Controls**

#### **NA7.5.4.1 Construction Inspection**

Prior to Functional Testing, verify and document the following:

- Economizer lockout setpoint complies with Table 144-C of §144(e)3.
- Economizer lockout control sensor is located to prevent false readings.
- System is designed to provide up to 100 percent outside air without over-pressurizing the building.
- For systems with DDC controls lockout sensor(s) are either factory calibrated or field calibrated.
- For systems with non-DDC controls, manufacturer's startup and testing procedures have been applied

#### **NA7.5.4.2 Functional Testing**

Step 1: Disable demand control ventilation systems (if applicable)

Step 2: Enable the economizer and simulate a cooling demand large enough to drive the economizer fully open. Verify and document the following:

- Economizer damper is 100 percent open and return air damper is 100 percent closed.
- For systems that meet the criteria of §144(e)1, verify that the economizer remains 100 percent open when the cooling demand can no longer be met by the economizer alone.
- All applicable fans and dampers operate as intended to maintain building pressure.
- The unit heating is disabled.

Step 3: Disable the economizer and simulate a cooling demand. Verify and document the following:

- Economizer damper closes to its minimum position.
- All applicable fans and dampers operate as intended to maintain building pressure.
- The unit heating is disabled