



2005 Title 24 Non-residential Efficiency Standards

Acceptance Requirements for Code Compliance

Tav Commins

California Energy Commission

Project Overview

Definition of Acceptance Testing Requirements

- **Acceptance Testing requirements are defined as the application of targeted inspection checks and testing to determine whether specific building systems conform to the criteria set forth in the Standards and to the plans and specifications.**



Project Overview

Acceptance Testing Requirements

- **Required since the 2005 Code.**



Project Overview

When are the Acceptance Tests Required

- **Any time HVAC equipment is installed**
 - **New Construction**
 - **HVAC Changeout in existing buildings**

Tests

Systems Covered and Associated Compliance Forms

■ Mechanical Systems

➤ Packaged and Split HVAC Tests

- Outside air (MECH-2A)
- HVAC system controls (MECH-3A)
- Economizer (MECH-4A)
- Duct leakage (MECH-5A)
- Demand control ventilation (MECH-6A)

Tests

Systems Covered and Associated Compliance Forms

Built-up HVAC Tests

- Outside air (MECH-2A)
- Economizer (MECH-4A)
- Demand control ventilation (MECH-6A)
- Supply Fan VFD Acceptance (MECH 7A)
- Valve Leakage Test (MECH-8A)
- Supply Water Reset Temperature Reset Controls (MECH-9A)

New Tests

Systems Covered and Associated Compliance Forms

➤ New Tests for 2008

- **Hydronic System Variable Flow Control Acceptance (MECH-10A)**
- **Automatic Demand Shed Control Acceptance (MECH-11A)**
- **Fault Detection and Diagnostics (FDD) for Packaged Direct-Expansion Units (MECH-12A)**

New Tests

Systems Covered and Associated Compliance Forms

➤ New Tests for 2008

- Automatic Fault Detection and Diagnostics (FDD) for Air Handling Units and Zone Terminal Units Acceptance (MECH-13A)
- Distributed Energy Storage DX AC Systems Acceptance (MECH-14A)
- Thermal Energy Storage (TES) System Acceptance (MECH-15A)

Tests

Systems Covered and Associated Compliance Forms

■ Lighting Systems

➤ Lighting Controls (LTG-2-A)

- Occupancy sensors

- Manual daylight controls

- Automatic time switch controls

➤ Automatic Daylight Controls (LTG-3-A)

Who Can Conduct the Tests

- **The installing contractor, engineer of record, TAB contractor, or owner's agent (i.e. 3rd party Cx provider)**
- **The building inspector has the authority to require the Acceptance Agent to demonstrate competence, to his/her satisfaction. The building inspector can exercise their authority to disallow that Acceptance Agent from being used in their jurisdiction or testing their own work.**

Compliance Forms

Plan Review Process

- **Verify that all Acceptance Test forms listed on the MECH-1-C and LTG-1-C forms are filled out completely and correctly, signed by the responsible party, and submitted for review.**

Building Departments:

Systems Acceptance. Before occupancy permit is granted for a newly constructed building or space, or a new space-conditioning system serving a building or space is operated for normal use, all control devices serving the building or space shall be certified as meeting the Acceptance Requirements for Code Compliance.

In addition a Certificate of Acceptance, MECH-1-A, Form shall be submitted to the building department that certifies plans, specifications, installation certificates, and operating and maintenance information meet the requirements of §10-103(b) and Title 24 Part 6.

Test Description	Test Performed By:
<p>✓ <input type="checkbox"/> MECH-2-A: Ventilation System Acceptance Document</p> <ul style="list-style-type: none"> • Variable Air Volume Systems Outdoor Air Acceptance • Constant Air Volume Systems Outdoor Air Acceptance <p><i>Test required on all New systems both New Construction and Retrofit.</i></p> <p>Equipment requiring acceptance testing VAV systems: AHU1, AHU2, AHU3</p> <p>Constant Volume systems: AHU4, ACU1, ACU2</p>	<p style="background-color: yellow;">TAB contractor with controls contractor to assist</p>
<p>✓ <input type="checkbox"/> MECH-3-A: Packaged HVAC Systems Acceptance Document</p> <p><i>Test required on all New packaged systems both New Construction and Retrofit.</i></p> <p>Equipment requiring acceptance testing ACU1, ACU2</p>	<p style="background-color: yellow;">Mechanical contractor with controls contractor to assist (DDC control)</p>
<p>✓ <input type="checkbox"/> MECH-4-A: Air-Side Economizer Acceptance Document</p> <p><i>Test required on all new air-side economizers for both New Construction and Retrofit. Units with economizers that are installed at the factory and certified with the Commission do not require equipment testing but do require construction inspection.</i></p> <p>Equipment requiring acceptance testing AHU1, AHU2, AHU3, AHU4, ACU2</p>	<p style="background-color: yellow;">Mechanical contractor with controls contractor to assist</p>

Field

Findings in the Field

■ At the Building Department

- **Plan Review** - All new buildings and alterations to existing building HVAC equipment require a MECH-1C to be filed. This document is being accepted by the building department without any of the acceptance requirements being checked.

Field

Findings in the Field

■ At the Building Department

- **Inspectors** – Most inspectors have never been told what an Acceptance Test is. If they have been told they do not understand what they are, when they are required and what they need to do to make sure the Tests are completed. Inspectors have a hard time understanding the Energy Forms that explain how the building is to be built.

Field

Findings in the Field

■ HVAC Contractors

- **Contractors** – Most contractors have never been told what an Acceptance test is.
- They have never been asked by an inspector to conduct an Acceptance Test.
- We are not sure that many contractors are capable of performing many of the tests.

California Commissioning Collaborative

Work Conducted by the Collaborative

- The CCC has updated the code for 2008.
 - **Standards** – Updated and changed to clarify existing requirements and to incorporate new test.
 - **Nonresidential Manual** - Updated the Acceptance chapter of the Nonresident Manual including the forms.



California Commissioning Collaborative

Training

■ Training

- **Online training to building department** – Not well attended. Hard to get building
- **In person training**
 - Working with SMACNA to train their members
 - Working CALBO to train inspectors at SMACNA training facilities.
 - California Energy Commission training to building departments.



California Commissioning Collaborative

Training

■ Updates to the 2008 code

- Updates to the 2008 Acceptance Tests should start in 2010. Would include updating the Standards, Manuals and Forms.

