

**INSTALLER AND INSPECTOR QUICK-REFERENCE:
2022 NRCA-LTI-02-A
Automatic Time Switch Controls**

Purpose and Scope of the Test

This test ensures that indoor lighting controlled by an automatic time switch control turns lighting on and off according to a programmed schedule and that manual override controls turn lighting on during scheduled off periods. Turning lighting off during typically unoccupied periods prevents energy waste.

Test Trigger

This test is required when automatic time-switch lighting controls are installed for nonresidential and hotel/motel buildings, and multifamily building common areas. All installed indoor lighting must be controlled by shut off controls.

Relevant Energy Code References and Required Compliance Documents

Title 24, Part 6 of the California Building Code, Building Energy Efficiency Standards (Energy Code) sections 110.9(b)1Aii, 130.1(c)1, 130.1(c)3, 130.1(c)4, 130.4(a), 160.5(b)4Ci, 160.5(b)4Ciii, 160.5(b)4Civ, and 160.5(e)1; NA7.6.2; NRCC-LTI-E, LMCC-LTI-E.

Who Can Perform the Test

This test must be performed by an acceptance test technician certified by a CEC-approved Acceptance Test Technician Certification Provider, using compliance document NRCA-LTI-02-A.

Required Tools

This test verifies the functionality of installed automatic time switch controls visually and does not require any tools.

Estimated Time to Complete Test

Construction inspection: 0.5 to 2 hours (depending on familiarity with lighting control programming)
Functional testing: 2 to 6 hours (depending on familiarity with lighting control programming, number of lighting circuits and override switches to be tested, and programmed time delays between on and off signals).

Potential Issues and Cautions

The manual override time limit can be adjusted to minimize test time, but the time limit setting (not to exceed 2 hours) must be reset upon completion of the test. When possible, perform the test when the spaces are unoccupied. Turning the lights off when other occupants are present can cause problems and unsafe working conditions.

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2022 NRCA-LTI-02-A
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Inspection Enforcement

- Verify that the construction inspection and functional testing items on NRCA-LTI-02-A are marked with "Complies."
- Verify the contact information of the acceptance test technician is complete with the acceptance test technician certification identification.
- Verify that all declaration statements on the last page of the NRCA-LTI-02-A are complete and that the document is signed.

Acceptance Criteria

Automatic time switch controls are programmed with acceptable weekday, weekend, and holiday schedules, per building occupancy profile.
The correct date and time are set in the time switch.
Program backup capabilities are present to prevent the loss of the device's schedules for at least 7 days, and the device's time and date setting for at least 72 hours if power is interrupted.
All lights turn on at the scheduled times.
All lights turn off automatically at the scheduled times.
The manual override switch is functional and turns associated lights on when activated.
The manual override time limit is no more than 2 hours, except for spaces that are exempt per exception to section 130.1(c)3B.
Manual override switches remote from the area with controlled luminaires allow the user to see the controlled luminaires or have a visual signal or display showing the state of controlled luminaires.
Follow the **Construction Inspection** and **Functional Testing** instruction on NRCA-LTI-02-A.

**INSTALLER AND INSPECTOR QUICK-REFERENCE:
2022 NRCA-LTI-02-A
Occupant Sensing Lighting Controls**

Purpose and Scope of the Test

The purpose of the test is to ensure that occupant sensing controls are functioning properly to achieve the desired lighting control. Occupant sensing controls are used to automatically turn lights on when a space is occupied, and automatically reduce or turn lighting off when the space is vacated after a pre-set time delay. The time delay will prevent lights from rapidly cycling on and off when spaces are entered frequently but temporarily. It also helps avoid false triggering when there is minimal occupant movement. Other types of occupant sensing controls include vacancy, partial-ON, and partial-OFF:

- Vacancy sensing controls automatically turn lighting off when a space is unoccupied but require lights to be turned on manually when the space is occupied.
- Partial-ON occupant sensing controls automatically turn lighting off when a space is unoccupied and automatically turns on part of the lighting load when the space is occupied.
- Partial-OFF occupant sensing controls automatically reduce lighting load when the space is unoccupied and automatically turns lighting on when the space is occupied.

Occupant sensing controls reduce energy waste by ensuring that lighting is off or reduced when not needed.

Test Trigger

This test is required when occupant sensing controls are installed in nonresidential and hotel/motel buildings, and multifamily building common areas. All installed indoor lighting must be controlled by shut off controls. Sections 130.1(c)5-130.1(c)7 and 160.5(b)4Cv-160.5(b)4Cvii require occupant sensing controls for specified space types.

Relevant Energy Code References and Required Compliance Documents

Title 24, Part 6 of the California Building Code, Building Energy Efficiency Standards (Energy Code) sections 130.1(c)1, 130.1(c)5–7, 130.4(a), 160.5(b)4Ci, 160.5(b)4Ci, 160.5(b)4Cv–vii, 160.5(e)1; NA7.6.1, NA7.6.2.4; NRCC-LTI-E, LMCC-LTI-E.

Who Can Perform the Test

This test must be performed by an acceptance test technician certified by a CEC-approved Acceptance Test Technician Certification Provider, using compliance document NRCA-LTI-02-A.

Required Tools

This test verifies the functionality of installed occupant sensing controls visually and does not require special instrumentation.

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2022 NRCA-LTI-02-A
Occupant Sensing Lighting Controls**

Estimated Time to Complete Test

Construction inspection: 0.25 to 0.5 hours (depending on visual and audible inspection requirements).
Functional testing: 0.5 to 1 hours (depending on necessity to adjust time delay or mask sensor to prevent false triggers).

Potential Issues and Cautions

It is important that the test be performed at a time when the acceptance test technician can have full control over the occupancy of the space. The time delay can be adjusted to minimize test time, but the time delay setting must be reset (to a time not to exceed 20 minutes) upon completion of the test. Detection of air movement from a heating, ventilation, and air conditioning (HVAC) diffuser or other source can cause the sensor to turn the lights on (especially with ultrasonic sensors). This can be avoided by ensuring that the occupant sensing control is located away from diffusers per applicable manufacturer instructions. If motion in an adjacent area is causing an unwanted trigger, the technician may adjust the coverage pattern intensity or mask the sensor with an opaque material.

Inspection Enforcement

- Required:
- Verify that the construction inspection and functional testing items on NRCA-LTI-02-A are marked with "Complies."
 - Verify the contact information of the acceptance test technician is complete with the acceptance test technician certification identification.

Inspection Enforcement (cont.)

- Verify that all declaration statements on the last page of the NRCA-LTI-02-A are complete and that the document is signed.

Acceptance Criteria

Occupant sensing lighting control is installed per manufacturer's instructions to minimize false triggering.

Status indicator or annunciator operates correctly.

Occupied Test:

- Occupant sensing control turns controlled lighting on immediately.
- Vacancy sensing control requires the occupant to manually switch controlled lighting on.
- Partial-ON occupant sensing control activates between 50-70 percent of the controlled lighting power and the occupant has the ability to manually activate 100 percent of the controlled lighting power.

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Acceptance Criteria (cont.)

Unoccupied Test:

- Occupant sensing control reduces or turns controlled lighting off at the pre-set time delay.
- Partial-OFF occupant sensing controls reduce controlled lighting power by at least 50 percent.
- The programmed maximum time delay is not greater than 20 minutes.
- Occupant sensing lighting control is installed per manufacturer's instructions to minimize false triggering such as to install an occupancy sensor away from HVAC diffusers to avoid probable false triggering.

Multi-zone occupant sensing lighting controls (in offices larger than 250 ft²):

- The area of control zones are 600 square feet or less.
- When a control zone is unoccupied, the occupant sensor reduces lighting in the controlled zone by at least 80 percent at the pre-set time delay.
- When all control zones are unoccupied, occupant sensing controls turns controlled lighting OFF at the pre-set time delay.

Follow the **Construction Inspection** and **Functional Testing** instruction on NRCA-LTI-02-A.