INSTALLER and INSPECTOR QUICK-REFERENCE:
2025 NRCA-PRC-05-F
Evaporative Condensers and Condenser Fan Motor Variable Speed Control

Purpose and Scope of the Test

This test ensures that the condensing temperature setpoint of the condenser is reset in response to ambient wet-bulb temperature, per the Energy Code.

This test ensures that the condenser fan speed is continuously variable, and the condenser fans are controlled in unison per the Energy Code.

This test ensures that the minimum condensing temperature control setpoint is 70°F or lower, per the Energy Code.

Test trigger

Newly Constructed Buildings: Applies to functional testing and verification of fan motor variable speed controls for evaporative and adiabatic condensers.

Condenser fan motor controls are required on any new evaporative or adiabatic condensers installed on new refrigeration systems.

Exceptions: Systems with adiabatic condensers in climate zones 1, 3, 5, 12, 14, or 16, or that use alternate condensing temperature control strategies that are approved by the Energy Commission are not required to reset condensing temperature based on ambient conditions.

Relevant Energy Code References and Required Compliance Documents

Title 24, Part 6 of the California Building Standards Code, Building Energy Efficiency Standards (Energy Code) sections 120.6(a)4A, 120.6(a)4C, 120.6(a)4E, 120.6(a)4F, 120.6(a)7; NA7.10.3.1, and NA7.10.3.3; NRCC-PRC-E; NRCI-PRC-E.

Who Can Perform the Test

There are no restrictions. The test is typically performed by the startup technician responsible for programming the setpoints in the control system. Note that the contractor can complete the test, and ATTCP certification is not required for this test at this time.

Required Tools

Performance of this test will require measuring the ambient wet-bulb temperature relative humidity, and condenser operating pressure. The recommended instrumentation needed to perform the test may include the following:

- A temperature sensor calibrated to +/- 0.7°F between -30°F and 200°F.
- A relative humidity (RH) sensor calibrated to +/- 1 percent between 5 percent and 90 percent RH.
- A pressure sensor shall be calibrated to +/- 2.5 psi between 0 and 500 psig.

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Estimated Time to Complete Test

Construction Inspection: 1 hour (for one evaporative condenser).

Functional testing: 3 hour (for one evaporative condenser).

Potential Issues and Cautions

Coordinate test procedures with the refrigeration or controls contractor, or the facility supervisor since they may be needed to assist with the manipulation of the control system.

To ensure proper overall system operation, make sure that the system pressure is not held at excessively low or high values for an extended period of time when varying the saturated condensing temperature (SCT) control setpoint. Avoid abrupt changes in pressure. Coordinate with facility operator or refrigeration contractor.

Inspection Enforcement

Required:

- The minimum saturated condensing temperature (SCT) control setpoint is at or below 70°F.
- The SCT value used by the control system is the temperature equivalent reading of the condenser pressure sensor.
- All drain leg pressure regulator valves (if used) are set below the minimum condensing temperature/pressure setpoint, and all receiver pressurization valves, such as the outlet pressure regulator (OPR), are set lower than the drain leg pressure regulator valve setting. This ensures that the pressure regulator valve and receiver pressurization valve settings do not force the actual condensing temperature to be higher than the minimum condensing temperature setpoint. (Note: These regulators are only used on small systems and rarely with evaporative condensers.)
- All pressure, temperatures, and humidity sensors have been calibrated and read accurately.
- Temperature sensors are mounted in a location away from direct sunlight.
- All sensor readings used by the condenser controller convert or calculate to the correct conversion units at the controller (e.g., saturated pressure reading is correctly converted to appropriate saturated temperature; dry-bulb and relative humidity sensor readings are correctly converted to wetbulb temperature, etc.).
- All condenser motors are operational and rotate in the correct direction.

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Inspection Enforcement (cont.)
Required:

- All condenser fan speed controls are operational and connected to condenser fan motors, and not in bypass.
- All speed controls are in "auto" mode.
- Records showing calibration was performed, what offsets or control system calibration values were used, and documentation of the instrumentation used for calibration.

Acceptance Criteria

- The evaporative condenser minimum condensing temperature control setpoint is 70°F or lower.
- The target condensing temperature is reset in response to ambient wet-bulb temperature, by using a temperature difference (TD) between the condensing temperature and the ambient wet-bulb temperature (dry-bulb for adiabatic).
- The condenser fan speed is continuously variable, and the condenser fans are controlled in unison – varying the speed of all fans serving a common condenser loop at the same time.