

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.

NA7.5.13.1 Construction Inspection

Prior to Performance Testing, verify and document the following:

- The water tank is filled to the proper level.
- The water tank is sitting on a foundation with adequate structural strength.
- The water tank is insulated and the top cover is in place.
- The DES/DXAC is installed correctly (refrigerant piping, etc.).
- Verify that the correct model number is installed and configured.

NA7.5.13.2 Equipment Testing

Step 1: Simulate cooling load during daytime period (e.g. by setting time schedule to include actual time and placing thermostat cooling set-point below actual temperature). Verify and document the following:

- Supply fan operates continually.
- If the DES/DXAC has cooling capacity, DES/DXAC runs to meet the cooling demand (in ice melt mode).
- If the DES/DXAC has no ice and there is a call for cooling, the DES/DXAC runs in direct cooling mode.

Step 2: Simulate no cooling load during daytime condition. Verify and document the following:

- Supply fan operates as per the facility thermostat or control system.
- The DES/DXAC and the condensing unit do not run.

Step 3: Simulate no cooling load during morning shoulder time period. Verify and document the following:

- The DES/DXAC is idle.

Step 4: Simulate a cooling load during morning shoulder time period. Verify and document the following:

- The DES/DXAC runs in direct cooling mode.

NA7.5.13.3 Calibrating Controls

Set the proper time and date, as per manufacturer's installation manual for approved installers.

NA7.5.14 Thermal Energy Storage (TES) Systems

The following acceptance tests apply to thermal energy storage systems that are used in conjunction with chilled water air conditioning systems.

NA7.5.14.1 Eligibility Criteria

The following types of TES systems are eligible for compliance credit:

- Chilled Water Storage
- Ice-on-Coil
- Ice Harvester
- Brine
- Ice-Slurry
- Eutectic Salt
- Clathrate Hydrate Slurry (CHS)

The following Certificate of Compliance information for both the chiller and the storage tank shall be provided on the plans to document the key TES System parameters and allow plan check comparison to the inputs used in the DOE-2 simulation. DOE-2 keywords are shown in ALL CAPITALS in parentheses.

Chiller:

- Brand and Model
- Type (Centrifugal, Reciprocating, Other)
- Capacity (tons) (SIZE)
- Starting Efficiency (kW/ton) at beginning of ice production (COMP - KW/TON - START)
- Ending Efficiency (kW/ton) at end of ice production (COMP - KW/TON/END)
- Capacity Reduction (% / o F) (PER – COMP - REDUCT/F)

Storage Tank:

- Storage Type (TES-TYPE)
- Number of Tanks (SIZE)
- Storage Capacity per Tank (ton-hours) (SIZE)
- Storage Rate (tons) (COOL – STORE - RATE)
- Discharge Rate (tons) (COOL – SUPPLY - RATE)
- Auxiliary Power (watts) (PUMPS + AUX - KW)
- Tank Area (CTANK – LOSS - COEFF)
- Tank Insulation (R - Value) (CTANK – LOSS - COEFF)

NA7.5.14.2 Functional Testing

Acceptance testing also shall be conducted and documented on the Certificate of Acceptance in two parts:

In the TES System Design Verification part, the installing contractor shall certify the following information, which verifies proper installation of the TES System consistent with system design expectations:

- The TES system is one of the above eligible systems.
- Initial charge rate of the storage tanks (tons).
- Final charge rate of the storage tank (tons).
- Initial discharge rate of the storage tanks (tons).
- Final discharge rate of the storage tank (tons).
- Charge test time (hrs).
- Discharge test time (hrs).
- Tank storage capacity after charge (ton-hrs).
- Tank storage capacity after discharge (ton-hrs).
- Tank standby storage losses (UA).
- Initial chiller efficiency (kW/ton) during charging.
- Final chiller efficiency (kW/ton) during charging.

In the TES System Controls and Operation Verification part, the installing contractor also shall complete the following acceptance testing to ensure the TES System is controlled and operates consistent with the compliance simulation. The installing contractor shall convey the results of the testing to the enforcement agency using the Certificate of Acceptance.

1. Verify that the TES system and the chilled water plant is controlled and monitored by an energy management system (EMS).

2. Force the time to be between 9:00 p.m. and 9:00 a.m. and simulate a partial or no charge of the tank and simulate no cooling load by setting the indoor temperature set point higher than the ambient temperature. Verify that the TES system starts charging (storing energy).
3. Force the time to be between 6:00 p.m. and 9:00 p.m. and simulate a partial charge on the tank and simulate a cooling load by setting the indoor temperature set point lower than the ambient temperature. Verify that the TES system starts discharging.
4. Force the time to be between noon and 6:00 p.m. and simulate a cooling load by lowering the indoor air temperature set point below the ambient temperature. Verify that the tank starts discharging and the compressor is off.
5. Force the time to be between 9:00 a.m. to noon, and simulate a cooling load by lowering the indoor air temperature set point below the ambient temperature. Verify that the tank does not discharge and the cooling load is met by the compressor only.
6. Force the time to be between 9:00 p.m. and 9:00 a.m. and simulate a full tank charge by changing the sensor that indicates tank capacity to the Energy Management System so that it indicates a full tank capacity. Verify that the tank charging is stopped.
7. Force the time to be between noon and 6:00 p.m. and simulate no cooling load by setting the indoor temperature set point above the ambient temperature. Verify that the tank does not discharge and the compressor is off.

NA7.6 Indoor Lighting Control Systems

Lighting control testing is performed on:

- Manual daylighting controls.
- Automatic daylighting controls.
- Occupancy sensors.
- Automatic time-switch control.

NA7.6.1 Automatic Daylighting Controls Acceptance

NA7.6.1.1 Construction Inspection

Prior to Functional testing, verify and document the following:

- All control devices (photocontrols) have been properly located, field-calibrated and set for appropriate set points and threshold light levels.
- Installer has provided documentation of setpoints, setting and programming for each device.
- Luminaires located in primary or secondary sidelit zone(s) or in skylit area(s) are controlled separately from non-daylit areas. Compare location of daylighting controlled luminaires against description of sidelit and skylit zones on the building plans.
- Luminaires located in primary or secondary sidelit zone(s) are controlled separately from skylit area(s)
- The location where calibration adjustments are made is remote from photosensor.
- In spaces with ceiling heights greater than 11 feet, the location where calibration adjustments are made is readily accessible to authorized personnel.