

CONSTRUCTION SPECIAL SPECIFICATION

SECTION 16995_S

ELECTRICAL SYSTEMS COMMISSIONING

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SPECIAL SPECIFICATION**SECTION 16995S****ELECTRICAL SYSTEMS COMMISSIONING****PART 1 - GENERAL****1.01 RELATED WORK SPECIFIED ELSEWHERE**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 01810S – Facility Commissioning Requirements
- C. Section 13995S – Special Construction Systems Commissioning
- D. Section 15995S – Mechanical Systems Commissioning

1.02 BUILDING SYSTEMS & COMPONENTS TO BE COMMISSIONED

- A. The following systems, equipment and their components are included in the scope of the commissioning activities and are considered to be commissioned systems and equipment.
 - 1. Section 16001 – Electrical Working Buildings
 - a. Confirm installation per contract requirements.
 - b. Confirm proper torque settings on all connections.
 - c. Confirm proper meggar test results on all cabling.
 - d. Confirm start/stop per contract sequence of operations.
 - 2. Section 16269 – Variable Frequency Controllers
 - a. Confirm installation per contract requirements.
 - b. Confirm proper torque settings on all connections.
 - c. Confirm proper meggar test results on all cabling.
 - d. Confirm start/stop per contract sequence of operations
 - 3. Section 16410S – Enclosed Switches and Circuit Breakers
 - a. Confirm installation per contract requirements.
 - b. Confirm proper torque settings on all connections.
 - c. Confirm proper meggar test results on all cabling.
 - 4. Section 16440 – Electrical Panelboards
 - a. Confirm installation per contract requirements.

- b. Confirm proper torque settings on all connections.
- c. Confirm proper meggar test results on all cabling.

1.03 RESPONSIBILITIES

- A. The Contractor shall be responsible for scheduling, supervising and performing start-up, testing and commissioning activities specified in this section and necessary to demonstrate to SNL successful operation of the commissioned systems.
- B. The Contractor shall review submittal data for conformance with requirements, shall authorize the initial starting of equipment and systems in a manner to avoid damage during construction, shall oversee start-up and testing, and shall document that the operational requirements of each system have been accomplished.
- C. The Contractor shall be responsible for adhering to applicable code required procedures, standards and industry practices to ensure personal safety, the safety of others, and facility safety with regard to electrical equipment operation and testing. If there are procedures in the checklists or the functional performance tests which conflict with safety, the contractor shall not proceed and shall notify the CxA immediately.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

- A. The Contractor shall provide the necessary equipment to fully test the commissioned systems as defined in the functional performance test procedures provided by the CxA.
- B. Instrumentation shall meet the following standards:
 - 1. Be of sufficient quality and accuracy to test and measure system performance within the tolerances required to determine adequate performance.
 - 2. Be calibrated on the manufacturers' recommended intervals with calibration tags permanently affixed to the instrument being used.
 - 3. Be maintained in good repair and operating condition throughout the duration of use on this project.
 - 4. Be re-calibrated/repared if dropped or damaged in any way since last calibrated.
 - 5. Field test metering used to check power system meter calibration shall be more accurate than the instrument being tested.

6. Waveshape and frequency of test equipment output waveforms shall be appropriate for the test and the tested equipment.

2.02 MEAN OF ACCESS

- A. The Contractor shall provide means for the CxA and Owner Representatives to access, observe and visually confirm proper operation of all equipment and systems. These means shall be in compliance with all OSHA and job-site safety regulations.

PART 3 - EXECUTION

3.01 GENERAL

- A. The Contractor shall attend commissioning meetings as required by the Prime Contractor.
- B. The Contractor shall report in writing to the CCL concerning the status of activities as they affect the commissioning process and the status of deficiencies found during site visits or the performance of functional testing.
- C. The Contractor shall provide the CxA with data sheets and submittals for equipment to be commissioned.
- D. The Contractor shall prepare a preliminary schedule for commissioning activities.
- E. The Contractor shall notify the CxA when commissioning activities not yet performed or scheduled will delay construction.

3.02 START-UP PLAN

- A. The Contractor shall perform start-up testing for each piece of equipment to ensure that the equipment and systems are properly installed and ready for operation, so that functional performance testing may proceed without delays.
- B. The Contractor shall prepare a start-up plan for each piece of equipment. This plan shall be submitted to the CxA for review and comment. The start-up plan shall consist, at a minimum of the manufacturer's standard start-up and check out procedures copied from the installation manuals.
- C. Four (4) weeks prior to expected start-up for a piece of equipment, the Contractor shall notify SNL in writing. The execution the start-up plan shall be directed and performed by the Contractor. The CxA and/or SNL may be present for the start-up of the equipment.
- D. The Contractor shall submit the completed checklists and startup reports to the CxA for review. The Contractor shall note all non-compliance items on these

checklists. The Contractor shall notify the CxA when outstanding items have been corrected.

- E. The Contractor shall complete the start-up plan and resolve or correct all issues resolved before functional testing may begin.

3.03 FUNCTIONAL PERFORMANCE TESTS

- A. The Contractor shall provide all documentation as requested to the CxA for development of functional performance testing procedures. This documentation shall include, at a minimum, manufacturer installation, start-up, operation and maintenance procedures. The CxA may request further documentation as necessary for the development of functional performance tests.
- B. The Contractor shall review the functional performance test procedures developed by the CxA.
 - 1. The Contractor shall respond in writing to the CxA regarding the acceptability of the proposed test procedures.
 - 2. The Contractor shall note any necessary modifications to the procedures due to the actual equipment/systems or safety concerns and shall submit these to the CxA for consideration.
- C. The Contractor shall place equipment and systems into operation and continue the operation as required during each working day of the testing activities.
- D. The Contractor shall accomplish the functional performance testing of equipment based on procedures developed by the CxA and as reviewed by the Contractor.
 - 1. The Contractor shall provide skilled technicians to operate the systems during functional performance testing.
 - 2. The Contractor shall correct any deficiencies identified during testing and retest equipment as required.
- E. Functional performance testing is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of the system upon mutual agreement between the Contractor, SNL and the CxA.
- F. Functional testing shall verify all sequences of operation defined in the Contract Documents for the commissioned equipment and systems.
 - 1. Testing shall occur by overriding local controls or setpoints, overriding controls at the BMS, manual enabling/disabling of the utility power, or other means mutually agreed to by the Contractor, the CxA and SNL to initiate sequences of operation and verify the response of the system.

2. Sequences of operation shall be verified under normal power, emergency power, and fire alarm scenarios.
- G. Upon successful completion of all functional performance tests, the Contractor(s) shall perform Integrated Systems Testing. The testing shall document and verify the proper response of all Division 16 systems to all potential utility and emergency power operating and failure scenarios.

3.04 DEFERRED FUNCTIONAL PERFORMANCE TESTING

- A. The Contractor shall perform any deferred testing as required to properly demonstrate successful operation to the SNL CM.
1. Some test conditions may not be able to be simulated and thus require these actual conditions to be present to implement the test.
 2. A mutually convenient time to SNL, CxA and Contractor will be scheduled when these test conditions will be present to conduct this deferred testing.
- B. The Contractor shall perform these tests as indicated in the functional performance test procedures.
- C. The Contractor shall correct any deficiencies or failures identified in the process of performing these tests.

END OF SECTION