

SECTION 27 08 00

COMMISSIONING OF COMMUNICATION SYSTEMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawing and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this section.

1.02 SUMMARY

- A. This section includes commissioning process requirements for communication systems, assemblies and equipment.
- B. Related Sections:
 - 1. Division 01 Section "General Commissioning Requirements" for general commissioning process requirements.

1.03 DESCRIPTION

- A. Refer to Division 01 Section "General Commissioning Requirements" for the description of commissioning.

1.04 DEFINITIONS

- A. Refer to Division 01 Section "General Commissioning Requirements" for definitions.

1.05 SUBMITTALS

- A. Refer to Division 01 Section "General Commissioning Requirements" for CxA's role.
- B. Refer to Division 01 Section "Submittals" for specific requirements. In addition, provide the following:
- C. Certificates of readiness
- D. Certificates of completion of installation, prestart, and startup activities
- E. O&M manuals
- F. Test Reports.

1.06 QUALITY ASSURANCE

- A. Test Equipment Calibration Requirements: Contractors will comply with test manufacturer' calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

1.07 COORDINATION

- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to coordination during the commissioning process.

PART 2 – PRODUCTS

2.01 TEST EQUIPMENT

- A. All standard testing equipment required to perform startup, initial checkout and functional performance testing shall be provided by the Contractor for the equipment being tested. For example, the communication contractor of Division 27 shall ultimately be responsible for all standard testing equipment for the communication system in Division 27. A sufficient quantity of two-way radios shall be provided by each subcontractor.
- B. Special equipment, tools and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included in the base bid price to the Owner and left on site, except for stand-alone data logging equipment that may be used by the CxA.
- C. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Owner upon completion of the commissioning process.
- D. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5°F and a resolution of + or - 0.1°F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 – EXECUTION

3.01 GENERAL DOCUMENTATION

- A. With assistance from the installing contractors, the CxA will prepare Pre-Functional Checklists for all commissioned components, equipment, and systems.
- B. **Red-lined Drawing:** The communication system contractor will verify all equipment, systems, instrumentation, wiring and components are shown correctly on red-lined drawing. Preliminary red-lined drawings must be made available to the Commissioning Team for use prior to the start of Functional Performance Testing. Changes, as a result of Functional Testing, must be incorporated into the final as-built drawings, which will be created from the red-lined drawings. The contracted party, as defined in the Contract Documents will create the as-built drawings.
- C. **Operation and Maintenance Data:** Communication System Contractor will provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems. The CxA will review the O&M literature once for conformance to project requirements. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the Contractor.
- D. **Demonstration and Training:** Communication System Contractor will provide demonstration and training as required by the specifications. A complete training plan and schedule must be submitted by the contractor to the CxA four weeks (4) prior to any training. A training agenda for each training session must be submitted to the CxA one (1) week prior to the training session.

3.02 COMMUNICATION SYSTEM CONTRACTOR'S RESPONSIBILITIES

- A. Perform commissioning tests at the direction of the CxA.
- B. Attend construction phase controls coordination meetings.
- C. Participate in communication systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.
- D. Provide information requested by the CxA for final commissioning documentation.
- E. Include requirements for submittal data, operation and maintenance data, and training in each purchase order or sub-contract written.

- F. Prepare preliminary schedule for Communication system orientations and inspections, operation and maintenance manual submissions, training sessions, equipment start-up task completion for owner. Distribute preliminary schedule to commissioning team members.
 - G. Update schedule as required throughout the construction period.
 - H. Assist the CxA in all verification and functional performance tests.
 - I. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.
 - J. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the specifications. Submit to CxA 45 days after submittal acceptance.
 - K. Coordinate with the CxA to provide 48-hour advance notice so that the witnessing of equipment and system start-up and testing can begin.
 - L. Participate in, and schedule vendors and contractors to participate in the training sessions.
 - M. Provide written notification to the CM/GC and CxA that the following work has been completed in accordance with the contract documents, and that the equipment, systems, and sub-system are operating as required.
 - 1. Communication Systems (example: cabling, routers, switches, fiber patch panels, software, fiber-optic cable, server racks, CAT 5E cable, CAT 6 cable, CAT 6a cable, computers, etc. to provide entire communication network) and all other equipment furnished under this Division.
 - N. The equipment supplier shall document the performance of his equipment.
 - O. Provide a complete set of red-lined drawings to the CxA prior to the start of Functional Performance Testing.
 - P. Equipment Suppliers
 - 1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner, to keep warranties in force.
 - 2. Assist in equipment testing per agreements with contractors.
 - 3. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.
 - Q. Refer to Division 01 Section "General Commissioning Requirements" for additional Contractor responsibilities.
- 3.03 CxA'S RESPONSIBILITIES
- A. Refer to Division 01 Section "General Commissioning Requirements" for CxA's Responsibilities.
- 3.04 TESTING PREPARATION
- A. Certify in writing to the CxA that communication systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.
 - B. Certify in writing to the CxA that communication instrumentation and controls have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.
 - C. Certify in writing that testing procedures have been completed and that testing reports have been submitted, discrepancies corrected, and corrective work approved.
 - D. Place systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
 - E. Inspect and verify the position of each device and interlock identified on checklist.
 - F. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.
- 3.05 GENERAL TESTING REQUIREMENTS
- A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.
 - B. Scope of Communication systems testing shall include the entire communication equipment installation, from the incoming equipment throughout the distribution system. Testing shall include all equipment and devices.

- C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.
 - D. The CxA along with the communications contractor(s) and other contracted subcontractors, shall prepare detailed testing plans, procedures, and checklists for communication systems, subsystems, and equipment.
 - E. Tests will be performed using design conditions whenever possible.
 - F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
 - G. The CxA may direct that set points be altered when simulating conditions is not practical.
 - H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.
 - I. If tests cannot be completed because of a deficiency outside the scope of the Communication system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.
 - J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.
- 3.06 COMMUNICATION SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES
- A. **Equipment Testing and Acceptance Procedures:** Testing requirements are specified in individual Division 27 sections. Provide submittals, test data, inspector record and certifications to the CA.
 - B. **Communication System Testing:** Field testing plans and testing requirements are specified in Division 27 Sections. Assist the CxA with preparation of testing plans.
 - C. **Communication System Testing:** Provide technicians, instrumentation, tools and equipment to test performance of designated systems and devices at the direction of the CxA. The CxA shall determine the sequence of testing and testing procedures for each equipment item to be tested.
 - D. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems and sub-systems. The following equipment and systems shall be evaluated:
 - 1. Master clock system
 - 2. Public address system
 - 3. Coordination and functionality with the Building Automation System/Building Management Controls System, if applicable
- 3.07 DEFICIENCIES/NON-CONFORMANCE, COST OF RETESTING, FAILURE DUE TO MANUFACTURER DEFECT
- A. Refer to Division 01 Section “General Commissioning Requirements” for requirements pertaining to deficiencies/non-conformance, cost of retesting, or failure due to manufacturer defect.
- 3.08 APPROVAL
- A. Refer to Division 01 Section “General Commissioning Requirements” for approval procedures.
- 3.09 DEFERRED TESTING
- A. Refer to Division 01 Section “General Commissioning Requirements” for requirements pertaining to deferred testing.
- 3.10 OPERATION AND MAINTENANCE MANUALS
- A. The Operation and Maintenance Manuals shall conform to Contract Documents requirements as stated in Division 01.
 - B. Refer to Division 01 Section “General Commissioning Requirements” for the AE and CxA roles in the Operation and Maintenance Manual contribution, review and approval process.

3.11 TRAINING OF OWNER PERSONNEL

- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to training.

END OF SECTION