

SPECIFICATION – TECHNICAL SECTION 16950
ELECTRICAL TESTING

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SECTION 16950: ELECTRICAL TESTING

PART 1 - GENERAL

A. Description

This section includes requirements for acceptance testing of the electrical system, wiring, equipment, and grounding.

B. Related Work Specified Elsewhere

1. General Electrical Requirements: 16010
2. Testing, Training, and Facility Startup: 01756

C. References

1. National Electric Testing Association (NETA):
 - a) ATS-1995 — Acceptance Testing Specifications for Electric Power Distribution Equipment and Systems.

D. Submittals

1. Pre-Test Submittals:
 - a) Testing service qualifications.
 - b) Test personnel qualifications (resumes).
 - c) Equipment testing schedule.
 - d) Test data forms.
2. Post -Test Submittals:
 - a) Summary of testing for the project.
 - b) Description of the equipment tested.
 - c) Description of the test and test procedures.
 - d) Test results.
 - e) Conclusions and recommendations.
 - f) Completed test forms, including witness's signatures.
 - g) List of test equipment and calibration documents.
 - h) Date and time.
 - i) Include the following data tabulated for each piece of equipment:
 - i) Circuit number.
 - ii) Equipment or motor name and tag number (where applicable).
 - iii) Nameplate full-load-ampere rating.
 - iv) Motor service factor.

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- v) Motor ambient temperature rating. vi) Overload relay rating. vii) Measured full load current.
- viii) Measured discharge pressures (where applicable).

- 3 Submit equipment test schedule no later than 7 days prior to scheduled date of testing.
- 4 Project Record Documents: Note or indicate wiring deviations from Contract Documents on Project Record Documents.

E. Quality Assurance

1. The Contractor shall retain a qualified Engineering appraisal and testing organization to provide inspections, tests, and evaluation to determine that the equipment designated herein is furnished in accord with specifications and is installed and adjusted for successful energization and operation.
2. Testing Firm:
 - a) Obtain services of an independent testing service firm that meets the Federal OSHA criteria for accreditation of testing laboratories, Title 29, Part 1910.7 and has a work history and qualifications acceptable to the Engineer.
 - b) The appraisal and testing organization shall have two or more years of experience related to the appraisal and testing of equipment designated herein.
 - c) The managing or supervising representatives of the appraisal and testing organization shall have extensive knowledge of the products involved and at least two years experience conducting appraisals and tests. All testing shall be conducted under the supervision of the managing or supervising representatives.
 - d) Testing technicians shall be trained and experienced in the testing they perform.
 - e) The engineering appraisal and testing organization shall utilize comprehensive report forms to document engineering appraisal and test results on all equipment's and products. Upon completion of the work, the report forms shall be signed by the managing or supervising engineering representative and included in the final report.

- f) Testing shall be done in accord with the manufacturer's instructions, these specifications, and applicable ANSI, ASTM and NEMA standards. Applicable product instructions shall be furnished to the Engineer for review.
- g) Prequalified Testing Services and Manufacturing Firms:
 - i) Electro-Test Inc.
 - ii) Square D Company Technical Services Divisions.
 - iii) General Electric Company.
- h) Qualifications of other testing services firms may be submitted.
- i) Testing service or testing personnel may be accepted or rejected based upon, but not limited to, the testing equipment intended to be used, the qualifications of the firm, and personnel.

F. Measurement and Payment

Payment for the work in this section shall be included as part of the lump-sum bid amount stated in the proposal.

PART 2 - MATERIALS Not

Applicable.

PART 3 - EXECUTION

A. Examination

1. Verify that electrical work is free from improper grounds, short circuits, and overloads.
2. Verify correctness of wiring first by visual comparison of the conductor connections with connection diagrams.
3. Make individual circuit continuity checks by using electrical circuit testers.

B. Acceptance Testing

1. Perform testing and allow Owner and Engineer to witness testing. Notify the Owner's representative three days or more in advance when any test is to take place.

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2. Perform electrical acceptance testing in accord with NETA Standards.
3. Perform tests to assure that electrical equipment specified to be tested will operate within industry and manufacturers published tolerances, and will perform safely. Record test result data, to be used as a baseline for future tests.
4. Testing of installed equipment shall result in acceptable test data. Equipment for which acceptable test data has not been submitted, or has been submitted but rejected, shall be deemed as not meeting Contract requirements.
5. Conduct 3 point fall of potential ground test by using equipment of one of the following manufacturer, or equal:
 - a) Biddle Company.
 - b) Associated Research.
7. Test insulation resistance of circuits. Test each complete circuit prior to energizing. Insulation resistance between conductors and between each conductor and ground shall not be less than 25 megohms. Repair or replace wires or cables in circuits that do not pass this test, and repeat the test.
8. Test project electrical equipment, including 4KV and 600 volt electrical distribution equipment, motor control centers, and grounding. Complete test reports for each individual piece of equipment. The following types of electrical equipment shall be tested according to the requirements of this specification section. Refer to the project documents to identify the equipment related to a specific project:
 - a) Power Distribution Switch
 - b) Molded Case Circuit Breaker.
 - c) Motor Circuit Protector, 200 HP and above.
 - d) Motors, 200 HP and above.
 - e) Grounding Electrode Systems and Equipment Grounding System (refer to section 16450 for additional requirements).
 - f) Protective Relays (relay settings shall be as documented in the project coordination study, see section 16010).
 - g) Three Phase Power Transformers.

- 9 Ground Fault Protective Equipment: The ground-fault protection system shall be performance tested after installation in accord with NEC 230-95C. Submit a written record of the test to the Owner's representative. Label on panel above the device with certification and values. Record current pickup level and time delay settings to which the equipment was finally adjusted. Measure and record relay pickup current and the relay time delay at two values above pickup. Test for correct system operation at 57% rated voltage. If relay pickup current is not within 5% of the manufacturer's calibration marks or fixed setting or relay timing does not conform with manufacturer's published time-current characteristic curves, repair or replace equipment and repeat test.
- 10 Motor Operating Test: Run each motor as nearly as possible to rated operating conditions. Record current in each phase of each motor 1/2 hp and larger and submit to the Owner's representative. Repair or replace motor or driven equipment if current exceeds motor nameplate current.
- 11 Power Company Voltage Test: When the installation is essentially complete and the facility is in operation, check the voltage at the point of termination of the power company supply system to the project. Check voltage amplitude and balance between phases for loaded and unloaded conditions. If the unbalance (as defined by NEMA) exceeds 1^o/0, or if the voltage varies throughout the day and from loaded to unloaded conditions more than +5% of nominal, make a written request to the Power Company that the condition be corrected. If corrections are not made, request that the Power Company official provide a written statement that the voltage variations and/or unbalance are within their normal standards.

B. Summary Test Report

1. Upon completion of testing in every area, submit summary test report.

END OF SECTION