

**Part 1 General**

**1.1 INTENT**

- .1 This Section specifies general requirements common to all starting and testing of electrical equipment and systems. Read this Section in conjunction with related Sections which specify specific portions of electrical starting and testing work.
- .2 Except where otherwise specified, arrange and pay for the testing and related requirements specified in this and related Sections.
- .3 If test results do not conform with applicable requirements, repair, replace, or adjust or balance equipment and systems. Repeat testing as necessary until acceptable results are achieved.

**1.2 RELATED SECTIONS**

- .1 Commissioning Plan: Section 01 91 13
- .2 Common Work Results For Electrical:  
Section 26 05 00
- .3 Electrical Starting and Testing by Contractor:  
Section 26 08 20
- .4 Electrical Equipment and Systems Demonstration and Instruction:  
Section 26 08 40

**1.3 SUBMITTALS**

- .1 Submit to the Owner a list of equipment and instruments which will be used in starting, testing, balancing and adjusting electrical equipment. The Minster may require changes to the proposed equipment and instruments.

**1.4 REPORTS**

- .1 Submit Contractor Start-Up Report forms in accordance with Section 01 00 01 documenting starting and testing procedures performed, and observed tests results obtained.
- .2 Submit field reports in accordance with Section 26 01 10.

## **1.5 STARTING AND TESTING - GENERAL**

- .1 Prior to testing ensure all electrical equipment is cleaned and free of dust.
- .2 After testing, protect equipment subject to dust from construction activities.
- .3 Notify Owner when starting and testing of all systems has been completed.
- .4 Do not conceal or cover equipment until inspected, tested and approved by Owner.
- .5 Assume all liabilities associated with starting, testing and balancing procedures.
- .6 Assume all costs associated with starting, testing, adjusting and balancing, including supply of testing equipment and witnessing of factory testing by Contractor and Owner.

## **1.6 WITNESSING OF STARTING AND TESTING**

- .1 Prior to starting and testing of electrical equipment or systems, prepare a schedule of all tests specified. Review schedule with Owner.
- .2 Provide sufficient notice (minimum three days) prior to commencing tests requiring witnessing by Owner.
- .3 Owner or Owner's Performance Testing Agent may witness all or any portion of testing and starting procedures performed by Contractor or Contractor's Testing Agent.
- .4 Contractor shall be present for all tests specified in Section 26 08 30.

## **1.7 MANUFACTURER'S STARTING RECOMMENDATIONS**

- .1 Prior to starting equipment or systems, obtain and review manufacturer's installation, operation and starting instructions. Read in conjunction with procedures specified in Sections 26 08 20 and 26 08 30.
- .2 Use manufacturer's and supplier's starting personnel where required to maintain validity of manufacturer's warranty. Confirm with manufacturer that all testing specified in this Section and Sections 26 08 20 and 26 08 30 will not void any warranties.
- .3 Compare installation to manufacturer's published data and record discrepancies. Modify procedures detrimental to equipment performance prior to starting equipment.

## **1.8 MANUFACTURER'S SERVICE ON SITE**

- .1 Arrange and pay for qualified manufacturer's representatives to supervise starting and testing of following electrical equipment and systems:
  - .1 Automatic Transfer Switch
- .2 Manufacturer's personnel shall be experienced in design and operation of equipment and systems being started and have ability to interpret results of readings, and tests and report results in a logical fashion.

## **1.9 REFERENCE DOCUMENTS**

- .1 Perform tests in accordance with:
  - .1 These Contract Documents.
  - .2 Requirements of authorities having jurisdiction.
  - .3 Manufacturer's published instructions.
  - .4 Applicable CSA, IEEE, IPCEA, EEMAC, NEMA and ASTM standards.
- .2 If requirements of any of the foregoing conflict, notify Owner before proceeding with tests and obtain clarification.

## **1.10 CONTRACTOR AND MANUFACTURER REPORTS**

- .1 Log and tabulate test results on appropriate test report forms provided by the Owner.
- .2 Submit completed test report forms immediately after tests are performed.
  - .1 Record all data gathered on site on approved test report forms.
  - .2 Note any damage, missing parts or incomplete work on test form.
  - .3 Record date of corrected deficiencies on form.
  - .4 Arrange for Owner to initial completed test report forms prior to the end of the work day that information is gathered. Provide the Owner with one photo copy of each completed test report form.
  - .5 Maintain one photocopy on site of all data taken during starting and testing period.
  - .6 Maintain one copy of all final starting, testing, balancing and adjusting reports on site up to interim acceptance of the work for reference purposes.
- .3 Arrange for manufacturer to submit copies of all production test records for production tests required by EEMAC and CSA standards for manufactured electrical equipment to the Owner prior to shipping.

- .4 Arrange for manufacturer to submit brief step-by-step description of entire starting procedure to allow Owner to repeat starting at any time.

#### **1.11 CORRECTION OF DEFICIENCIES**

- .1 Correct all contract deficiencies found during electrical starting and testing of equipment and systems and Owner's performance verification.

#### **1.12 CONTRACTOR'S TESTING AGENTS**

- .1 Arrange and pay for services of testing agent(s) to perform tests and verifications specified in Section 26 08 30 - Electrical Starting and Testing by Contractor's Testing Agent.
- .2 Contractor's Testing Agent(s) Qualifications:
  - .1 Registered testing firm whose normal day to day business is electrical testing.
  - .2 Testing agent shall be independent of any Supplier, Contractor or Subcontractor who's work is tested and shall not have any financial or other interests in or with the Contractor.
  - .3 Minimum of five years experience in the maintenance and testing of electrical equipment and systems at all voltage levels up to and including 25 KV class.
  - .4 Employ at least one electrician holding a current journeyman's certificate in the Province of Alberta.
  - .5 Personnel involved in power system testing shall have proven experience in the use of the following test equipment:
    - .1 Meggers 250 volts, 1000 volt and 2500 volt.
    - .2 DC hipot test equipment up to 100 kV DC.
    - .3 Capacitance bridges.
    - .4 Transformer ratio test equipment.
    - .5 Contact resistance testers (ductor).
    - .6 Protective relay test equipment of current injection type for testing and calibration of induction disc and solid state protective devices.
- .3 Contractor's Testing Agent(s) Report:
  - .1 Arrange for Contractor's Testing Agent(s) to submit three bound copies of all test results, together with deficiency lists, and summary of tests, and include recommendations for any corrective action required directly to the Owner.

**1.13 OWNER'S PERFORMANCE TESTING AGENT(S)**

- .1 The Owner, at his option, following Interim Acceptance may arrange for services of a performance testing agent to separately test or retest electrical equipment or systems.
- .2 Performance testing agent may witness any or all tests or start ups which are the responsibility of the Contractor as specified in Sections 26 08 20 - Electrical Starting and Testing by Contractor and Section 26 08 30 - Electrical Starting and Testing by Contractor's Testing Agent
- .3 Performance testing of any system by the Owner does not reduce the Contractors obligations for complete testing and start up of systems as specified.

**1.14 COORDINATION**

- .1 Coordinate starting of electrical equipment and systems with testing and demonstration and instruction of:
  - .1 Electrical equipment and systems specified in Division 26.
  - .2 Mechanical equipment and systems specified in Division 20 to 23.
  - .3 Other equipment and system specified in other Divisions.
- .2 Where any equipment or systems requires testing prior to starting, ensure that such work has been completed prior to starting of electrical equipment and systems.

**Part 2 Products**

**2.1 TEST EQUIPMENT**

- .1 Provide all equipment and tools necessary to perform testing specified and as otherwise required.

**END OF SECTION**