

SECTION 16950

ELECTRICAL SYSTEMS TESTING AND COMMISSIONING

PART 1 - GENERAL

1.1 SUMMARY

- A. The purpose of this section is to describe the general requirements for acceptance testing as part of the commissioning of a new construction project.
- B. This work shall be performed by qualified contractor(s) with certified membership of the National Electrical Testing Association (NETA).
- C. Tests described in Parts 4 & 5 below shall be witnessed by Stanford's representatives upon timely notification.

PART 2 - CODES & STANDARDS

- 2.1 All acceptance testing requirements and procedures shall comply with the following codes and standards wherever applicable:
 - A. National Electrical Testing Association (NETA)
 - B. California Electrical Code (CEC)
 - C. Institute of Electrical & Electronics Engineering (IEEE)
 - D. National Electrical Manufacturing Association (NEMA)
 - E. American National Standards Institute (ANSI)

PART 3 – DATA REQUIRED FOR ACCEPTANCE TESTING

- 3.1 The following project data are required for the successful completion of this work:
 - A. Single Line Diagram from the approved set of Construction Drawings.
 - B. Approved Shop drawings of the major electrical equipment listed in Part 4 below.
 - C. Short Circuit / Coordination Study for the power system of the Project complete with recommended device settings.
 - D. Section 16011 – Arc Flash Hazard Protection

- E. Any pertinent drawings/data if the power system to be tested is electrically connected with the other building systems (examples: lab exhaust fans connected to the emergency power system; circuit breakers with shunt trips. . . etc)

PART 4 – INDIVIDUAL SYSTEM FUNCTIONAL TESTS

- A. The following electrical systems shall be individually tested per NETA procedures and standards where applicable.
 - 1. Main switchboards (MSB) and the associated main and feeder breakers. (Note, all breakers in the MSB shall be manually tripped and re-closed three (3) times to prove their operational integrity).
 - 2. Grounding system.
 - 3. Ground fault protection system (GFP)
 - 4. 600V feeder cables AWG #1 and larger.
 - 5. Motor control centers (MCC)
 - 6. Secondary 480V / 208 / 120V distribution dry type transformers.
 - 7. Power distribution panels (DP) 400A and higher
 - 8. Individual combination motor starters.
 - 9. 600V feeder bus ducts.
 - 10. Emergency power gen-sets and associated automatic transfer switches (ATS)
 - 11. Uninterruptible Power System (UPS) and associated battery system.
 - 12. Metering system with special attention to current transformer polarity.
 - 13. Circuit breakers with shunt trip circuits.

PART 5 – INTEGRATED SYSTEM FUNCTIONAL TEST

- A. Perform the following typical (but not limited to) integrated building electrical systems:
 - 1. Performance of the emergency power system as a response to simulated loss of normal power system via the ATS's
 - 2. Performance of the life safety related systems & certain critical processes as a response to the activation of the emergency power system. These systems consist of, but not limited to, the following:
 - a. Emergency lighting systems
 - b. Lab exhaust system to be staged in the start-up process via the EMCS system to prevent tripping of the generator breaker from high inrush currents.
 - c. Sewer & condensate pump systems.

- d. Fire protection system.
- e. EMCS
- f. Critical process systems such as air compressors, PCW. . .etc.

PART 6 – FINAL TEST REPORTS

- A. Three (3) copies of the completed test reports shall be submitted to the Stanford Project Manager.
- B. Any improvements to the system that are deemed appropriate for future implementation shall be described in these reports.

END OF SECTION