

# QA/QC Checklist

PENNSYLVANIA STATE UNIVERSITY



Construction Services

## DIVISION 26 – Electrical

### 26 05 10 – Electrical Testing

	General Information	Programming/Design	Bidding/Preconstruction	Installation/Construction	Closeout/Warranty
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#### 01 Electrical Acceptance Tests

1. Testing shall be performed by an independent, 3 <sup>rd</sup> party organization that is professionally independent of the manufacturers, suppliers, vendors, and installers (contractors) of the equipment or systems being evaluated.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. The name (and credentials) of the testing company shall be submitted to Engineering Services for review and approval. Contact Chuck Dobbins ( <a href="mailto:ccd10@psu.edu">ccd10@psu.edu</a> ; (814) 777-1583), OPP Senior Electrical Engineer.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Notify Engineering Services at least seven (7) days prior to any testing. A representative from ES shall witness the testing. Contact Chuck Dobbins.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. The electrical acceptance testing shall conform to the latest version of National Electrical Testing Association (NETA) Acceptance Testing Specifications (ATS). Testing shall include all NETA tests marked as “optional” unless waived (in writing) by Engineering Services. Equipment to be included in the tests is listed on the OPP Design and Construction Standards webpage under item <a href="#">26 05 10.01G</a> of the Electrical Acceptance Testing section.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Verify that any switchgear, panelboards, AND individual breakers (100 amp and greater) have been tested prior to being placed into service (even for temporary power).	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. The test report shall be in the Megger PowerDB format. Sample formats can be viewed on the <a href="#">PowerDB</a> website. The contractor shall provide one (1) electronic copy and four (4) hard copies of the completed report to Engineering Services. The testing firm should contact Chuck Dobbins to obtain the PSU standard PowerDB test forms.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

#### 02 System Function Tests

1. The acceptance tests are to also include testing of comprehensive electrical systems as well as individual equipment. These tests are to verify the correct interaction of all sensing, process, and action devices after individual equipment is tested.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Verify the correct operation of all safety devices for fail-safe functions.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Verify the correct operation of all sensing devices, alarms, and indicating devices.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

#### 03 Thermographic Surveys

1. Perform surveys on all current carrying devices. The survey shall be performed	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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during periods of maximum possible loading and prior to the expiration of the warranty or bond period.					
2. Prior to performing surveys, contact Ed Thomas ( <a href="mailto:ext9@psu.edu">ext9@psu.edu</a> ; (814) 777-2956), OPP Electrical Integrity Supervisor, to review panels/gear and witness test.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. In accordance with the latest version of NETA ATS standards, a complete report shall be submitted to Engineering Services identifying deficient areas and recommendations for corrective actions.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. If a follow-up thermographic survey is required prior to expiration of the bond/warranty, contact Ed Thomas to coordinate at 11 months after the Substantial Completion date.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

### 04 Electromagnetic Field Tests

1. This test is an optional test that is generally required when research equipment is being installed that may be sensitive to electromagnetic magnetic fields (EMF).	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. The test shall determine the vector-valued quantity of magnetic flux density for power frequency magnetic fields over a predetermined space or area. Contact Chuck Dobbins to designate.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. In accordance with the latest version of NETA ATS standards, a complete report shall be submitted to Engineering Services.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

### 05 Voltage Drop Tests

1. A voltage test shall be made at the last receptacle of each branch circuit of each panelboard. The total voltage drop shall not exceed 3% of the initial voltage measured at the end of that branch circuit. The test shall be made using a 12A load attached to the furthest receptacle.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. The contractor shall correct any installation with a voltage drop greater than 3%.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. If a branch circuit fails the test, all other branch circuits on that panel shall be tested.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. A copy of the test report shall be submitted to Engineering Services.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

### 06 Grounding Tests

1. The building ground ring shall be tested before backfilling. Testing shall be completed using the “fall of potential” method and shall conform to NETA standards. The fall of potential test consists of three connection points; one at the electrode being tested and two other are probes (one current and one potential) placed in the soil by the tester. The ground resistance relative to the earth shall be below the minimum levels listed on the OPP Design and Construction Standards webpage under item <a href="#">26 05 26.01E</a> of the Grounding and Bonding of Electrical Systems section.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Verify that point-to-point tests are performed to determine the resistance between the main grounding system and all other major electrical equipment frames, system neutral, and derived neutrals points. Resistance shall not exceed 0.5 ohms. Tests shall conform to NETA standards.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

3. A copy of the test reports shall be submitted to Engineering Services.