



Electrical Maintenance and Testing

An Overview
of the
InterNational Electrical Testing Association

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April 14-17, 2016

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Power Systems Testing



Goals for Today's Discussion

- Who is the InterNational Electrical Testing Association (NETA)
- How can NETA help the industry and end user?
- NETA's ANSI standards
 - Acceptance testing specification (ATS-2013)
 - Maintenance testing specification (MTS-2015)
 - Electrical commissioning specification (ECS-2015)
 - Test technician certification (ETT-2015)
- Section 7 structure of the ATS and MTS standards
- *NETA World* technical journal
- Electrical Safety & Maintenance conference *PowerTest*



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Who is NETA?

The InterNational Electrical Testing Association (NETA) was formed in 1972 to establish uniform testing procedures for electrical equipment and apparatus.

NETA has been an Accredited Standards Developer for ANSI since 1996.

NETA's scope of standards activity is different than that of IEEE, NECA, NEMA, and UL. NETA's review and updating of presently-published standards takes into account both national and international standards.

NETA develops specifications for: 1) the acceptance of new electrical apparatus prior to energization, 2) the maintenance of existing apparatus to determine its suitability to remain in service, 3) the electrical commissioning of newly-installed or retrofitted electrical apparatus, and 4) to codify the experience, education, and training requirements for an individual to obtain a level of competency as an electrical test technician.

NETA also services the electrical industry through representation on standards, accrediting testing companies, certifying test technicians, publishing of a technical journal, sponsoring an annual safety and maintenance conference, and providing industry specific training.

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NETA Vision and Mission



NETA Vision
To assure that safety, quality, and system reliability are basic foundations of the electrical infrastructure.



NETA Mission
To serve the electrical testing industry by:

- Establishing standards
- Publishing specifications
- Accrediting independent, third-party electrical testing companies
- Certifying test technicians
- Collecting and disseminating information and data
- Educates the public and end user about the merits of electrical acceptance and maintenance testing

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How Can NETA Help The End User?



For End Users - The NETA Accredited Company (NAC) is:

- Independent, third-party testing entity
- Unbiased testing authority
- Well established and a full-service entity in the electrical testing and maintenance business
- Independent of manufacturers, suppliers, and installers
- Has a professional engineer review all engineering reports
- Assures that the test technician is trained to inspect, test, maintain, and calibrate all types of electrical equipment across all business sectors



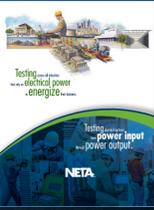
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How Can NETA Help The Industry?



For The Industry - The NETA Association is:

- Well established (Since 1972)
- An accredited Standards Developer for ANSI
- Promotes electrical safety and maintenance
- Defines the field testing standards by which electrical power equipment is deemed safe and reliable
- Accredits testing companies and certifies test technicians
- Collects and disseminates data of value to the electrical testing industry
- Publishes a quarterly technical journal, *NETA World*, for the industry
- Provides an educational outreach every year with an industry-specific technical conference, *PowerTest*



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NETA Membership Snapshot



- Members:
 - United States, Canada, Puerto Rico, Chile and Brussels
- 2,200 Certified Technicians
- 1,100 Individual Alliance Partners
- International Associates:
 - 60 countries - Australia, Columbia, Cuba, England, Finland, Greece, Hong Kong, India, Mexico, Saudi Arabia, Sweden, Thailand and many more



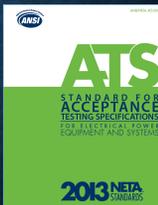
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ANSI/NETA ATS-2013



- ANSI/NETA Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems
- Developed for use by those responsible for assessing the suitability for initial energization of electrical power equipment and systems
- Specifies field tests and inspections that ensure these systems and apparatus perform satisfactorily, minimizing downtime and maximizing life expectancy
- This standard should always be referenced in design specifications or when performing acceptance testing on power system installations



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ANSI/NETA MTS-2015



- ANSI/NETA Standard for Maintenance Testing Specifications
- Developed for use by those responsible for the continued operation of existing electrical systems and equipment
- Provides a guide in specifying and performing the necessary tests to ensure that these systems and apparatus perform satisfactorily, minimizing downtime and maximizing life expectancy
- This standard should always be referenced when writing maintenance specifications or performing routine testing on electrical power systems



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ANSI/NETA ECS-2015

- ANSI/NETA Standard for Electrical Commissioning Specifications
- Developed for use by those responsible for assessing the suitability for initial energization of electrical power equipment and systems
- These specifications describe the systematic process of documenting, and placing into service newly-installed or retrofitted electrical power equipment and systems. This document shall be used in conjunction with the ANSI/NETA Acceptance Testing Specifications (ANSI/NETA.ATS)
- This standard should always be referenced in design specifications or when performing acceptance testing on power system installations



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ANSI/NETA ETT-2015

- ANSI/NETA Standard for Certification of Electrical Testing Technicians
- The Preface of Standard for Certification of Electrical Testing Technicians succinctly states the necessity of this document
- This standard was created to codify the experience, education, and training requirements necessary for an individual to obtain a level of competency as an electrical test technician
- This standard should always be referenced when specifying minimum individual qualifications



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Creating Standards



- Initially, can seem like a daunting task.
- Needs to have a defined scope and goal.

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Creating Standards



COURAGE
Do one brave thing today... then run like hell.

- But you have to start somewhere.

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Creating Standards



When a standard developing group becomes aligned, progress can be made.

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Creating Standards



And in time, cooperation and concerted effort produces a viable and meaningful standard or set of standards.

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Testing Specification Layout and Structure: ATS, MTS, ECS






The test specifications are arranged in the following sections:

- Section 1: General Scope
- Section 2: Applicable References
- Section 3: Qualifications
- Section 4: Division of Responsibility
- Section 5: General
 - Safety, suitability of test equipment, calibration, documentation
- Section 6:
 - Power System Studies (ATS/MTS)
 - Commissioning Process (ECS)
- Section 7:
 - Inspection and Test Procedures (ATS/MTS)
 - Inspection and Commissioning Procedures (ECS)
- Section 8: System Function Tests (ATS/MTS)
- Section 9: Thermographic Survey
- Section 10:
 - Electromagnetic Survey (ATS/MTS)
 - Transfer to Owner (ECS)
- Tables and Appendices

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Section 7 Structure: ATS and MTS





- Section 7, Inspection and Test Procedures in ATS and MTS
 - The main body of the document, with specific information on *what to do* relative to testing of electrical power equipment and systems
 - The specification is not intended to be a “how to test” document
- There are four main bodies of information in Section 7:
 - A. Visual and Mechanical Inspection
 - B. Electrical Tests
 - C. Test Values – Visual and Mechanical
 - D. Test Values – Electrical
- Optional Tests
 - There are certain tests identified as “optional” with an asterisk
 - Does another test provide similar information
 - Cost of test versus data from similar tests
 - How commonplace is the test

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Section 7 Structure: ATS and MTS



7. INSPECTION AND TEST PROCEDURES

7.1 Switchgear and Switchboard Assemblies

1. Visual and Mechanical Inspection

1. Compare equipment nameplate data with drawings and specifications.
2. Inspect physical and mechanical condition.
3. Inspect anchorage, alignment, grounding, and required area clearances.
4. Verify the unit is clean and all shipping bracing, loose parts, and documentation shipped inside cabinets have been removed.
5. Verify that fuse and circuit breaker sizes and types correspond to drawings and coordination study as well as to the circuit breaker’s address for microprocessor-communication packages.
6. Verify that current and voltage transformer ratios correspond to drawings.
7. Verify that wiring connections are tight and that wiring is secure to prevent damage during routine operation of moving parts.
8. Inspect bolted electrical connections for high resistance using one or more of the following methods:
 1. Use of a low-resistance ohmmeter in accordance with Section 7.1.2.
 2. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer’s published data or Table 100.1.2.
 3. Perform thermographic survey in accordance with Section 9.
9. Verify operation and sequencing of interlocking systems.
10. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding

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Section 7 Structure: ATS and MTS



7. INSPECTION AND TEST PROCEDURES

7.1 Switchgear and Switchboard Assemblies (continued)

3. Test Values

3.1 Test Values – Visual and Mechanical

1. Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value. (7.1.1.8.1)
2. Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.12. (7.1.1.8.2)
3. Results of the thermographic survey shall be in accordance with Section 9. (7.1.1.8.3)

3.2 Test Values – Electrical

1. Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value.

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Section 7 Structure: ATS and MTS



2. Electrical Tests – AC Induction

1. Perform resistance measurements through bolted connections with a low-resistance ohmmeter, in accordance with Section 7.15.1.1.
2. Perform insulation-resistance tests in accordance with ANSI/IEEE Standard 43.
 1. Machines larger than 200 horsepower (150 kilowatts):
Test duration shall be ten minutes. Calculate polarization index.
 2. Machines 200 horsepower (150 kilowatts) and less:
Test duration shall be one minute. Calculate dielectric-absorption ratio for 60/30 second periods.

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Section 7 Structure: ATS and MTS



3.2 Test Values – Electrical Tests

1. Compare bolted connection resistance values to values of similar connections. Investigate any values that deviate from similar bolted connections by more than 50 percent of the lowest value.
2. The recommended minimum insulation resistance ($IR_{1 \text{ min}}$) test results in megohms shall be in accordance with Table 100.11.
 - 2.1 The polarization index value shall not be less than 2.0.
 - 2.2 The dielectric absorption ratio shall not be less than 1.4.

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NETA World Journal

NETA World Journal, NETA World Online

Circulation 7,500 per issue

Readership 125,000 World Wide

30+ Volunteer Authors

Technical articles related to electrical power system testing, maintenance, reconditioning, commissioning, safety, trends, etc.



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PowerTest 2017

- February 27- March 3, 2017
- Premier electrical maintenance, reliability, and safety event
- New product forum
- Industry trade show with 100+ vendor booths
- Training and educational opportunities
- Social networking and peer-to-peer interaction
- PowerTest conference Web site: www.powertest.org





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ENERGIZE YOUR FUTURE

Join us in the land of golden promise.
February 27 through March 3



ANAHEIM-CALIFORNIA
February 27 - March 3 - 2017
DISNEYLAND HOTEL

POWERTESTING: SEE US LIVE!
CONFERENCING: SEE US LIVE!
TRAINING: SEE US LIVE!
THE PREMIER ELECTRICAL MAINTENANCE & SAFETY EVENT



February 27-March 3, 2017 | Anaheim, California

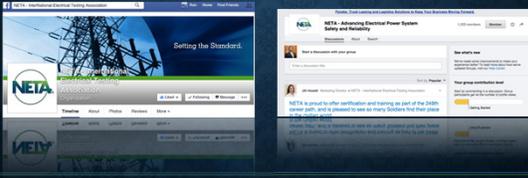
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Like us on Facebook at:
facebook.com/netaworld.org

LinkedIn – Join the NETA Group:
NETA – Advancing Electrical Power System Safety and Reliability



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Summary



- NETA is here to serve the electrical testing, maintenance, safety and reliability industry
- NETA provides consensus standards on "what to do" for the acceptance, commissioning, and maintenance of new and service-aged electrical equipment and systems
- NETA accredits testing companies to assure quality of product
- NETA has an ANSI process and standard to certify electrical test technicians
- The four ANSI/NETA standards are:
 - Acceptance testing specification (ATS-2013)
 - Maintenance testing specification (MTS-2015)
 - Electrical commissioning specification (ECS-2015)
 - Test technician certification (ETT-2015)
- Section 7 of the ATS and MTS standards detail exactly "what to do"
- NETA World is fantastic resource for industry information and trends

VISION WITHOUT EXECUTION IS HALLUCINATION.
-thomas edison

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Key NETA Contacts



				
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