Approved American National Standard

ANSI

ANSI/NETA ECS-2015

ECS

STANDARD FOR ELECTRICAL COMMISSIONING SPECIFICATIONS

FOR ELECTRICAL POWER EQUIPMENT AND SYSTEMS

2015 NETA® STANDARDS

ANSI/NETA ECS-2015

STANDARD FOR ELECTRICAL COMMISSIONING SPECIFICATIONS for Electrical Power Equipment and Systems

Secretariat
NETA (InterNational Electrical Testing Association)

Approved by
American National Standards Institute

American National Standard

Approval of an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

Caution Notice: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

Published by
InterNational Electrical Testing Association
3050 Old Centre Ave., Suite 102
Portage, MI 49024
269.488.6382 · FAX 269.488.6383
www.netaworld.org
neta@netaworld.org
Jayne Tanz, CMP - Executive Director

Copyright Information and Alteration of Content

2015 ANSI/NETA ECS *Standard for Electrical Commissioning Specifications for Electrical Power Equipment and Systems* is protected under the copyright laws of the United States, and all rights are reserved. Further, the ANSI/NETA ECS may not be copied, modified, sold, or used except in accordance with such laws and as follows:

Purchasers may reproduce and use all or a portion of the 2015 ANSI/NETA ECS *Standard for Electrical Commissioning Specifications for Electrical Power Equipment and Systems* provided 2015 ANSI/NETA ECS *Standard for Electrical Commissioning Specifications for Electrical Power Equipment and Systems* is clearly identified in writing as the source of all such uses or reproductions.

2015 ANSI/NETA ECS *Standard for Electrical Commissioning Specifications for Electrical Power Equipment and Systems* may be reproduced and used in whole or in part for the purpose of creating project specifications, basis of design documentation, maintenance plans, or other similar uses that purport to require compliance with the contents of this document.

The following sections of the 2015 ANSI/NETA ECS *Standard for Electrical Commissioning Specifications for Electrical Power Equipment and Systems* must be incorporated by reference as part of any subsection:

3. Qualifications
4. Division of Responsibility
5. General

The user of this document is required to include the above sections with any other section(s) reproduced from this document.

InterNational Electrical Testing Association
3050 Old Centre Ave., Suite 102
Portage, MI 49024
Voice: 888.300.6382 Facsimile: 269.488.6383
E-mail: neta@netaworld.org • Web: www.netaworld.org

Standards Review Council

The following persons were members of the NETA Standards Review Council which approved this document.

Timothy J. Cotter
Lorne J. Gara
Roderic L. Hageman
David Huffman
Ralph Patterson
Alan D. Peterson
Jayne Tanz
Ron Widup

Electrical Commissioning Specifications Ballot Pool Members

The following persons were members of the Ballot Pool which balloted on this document for submission to the NETA Standards Review Council.

Ken Bassett
Tom Bishop
Scott Blizard
Brian Borst
Michael Bowers
John Cadick
Michel Castonguay
Tim Crnko
David Geary
Paul Hartman
John Hauck
Kerry Heid
Andrew Kobler
Korey Kruse
Ben Lanz
Mark Lautenschlager
Finley Ledbetter, III
Jerry Parnell
Lee Perry
Tony Perry
Mose Ramieh
Randall Sagan
Mark Siira
Jeremy Smith
Richard Sobhraj
Alan Turpen
Wally Vahlstrom
Vicki Warren
Chris Werstiuck
John White
Jean-Pierre Wolff

NOTICE

In no event shall the InterNational Electrical Testing Association be liable to anyone for special, collateral, incidental, or consequential damages in connection with or arising out of the use of these materials.

This document is subject to periodic review, and users are cautioned to obtain the latest edition. Comments and suggestions are invited from all users for consideration by the Association in connection with such review. Any such suggestions will be fully reviewed by the Association after giving the commenter, upon request, a reasonable opportunity to be heard.

This document should not be confused with federal, state, or municipal specifications or regulations, insurance requirements, or national safety codes. While the Association recommends reference to or use of this document by government agencies and others, use of this document is purely voluntary and not binding.

InterNational Electrical Testing Association
3050 Old Centre Ave., Suite 102 • Portage, MI 49024
Voice: 888.300.6382 Facsimile: 269.488.6383
Email: neta@netaworld.org • Web: www.netaworld.org
Jayne Tanz, CMP - Executive Director

FOREWORD

(This Foreword is not part of American National Standard ANSI/NETA ECS-2015)

The InterNational Electrical Testing Association (NETA) was formed in 1972 to establish uniform testing procedures for electrical equipment and systems. NETA has been an Accredited Standards Developer for the American National Standards Institute since 1996. NETA's scope of standards activity is different from that of IEEE, NECA, NEMA, and UL. In matters of testing electrical equipment and systems NETA continues to reference other standards developers' documents where applicable. NETA's review and updating of presently published standards takes into account both national and international standards. NETA's standards may be used internationally as well as in the United States. NETA firmly endorses a global standardization. IEC standards as well as American consensus standards are taken into consideration by NETA's ballot pools and reviewing committees.

The 2015 ANSI/NETA *Standard for Electrical Commissioning Specifications for Electrical Power Equipment and Systems* is the first edition and most current revision of this document, and was approved as an American National Standard on December 3, 2014.

The ANSI/NETA *Standard for Electrical Commissioning Specifications for Electrical Power Equipment and Systems* should be used in conjunction with the most recent edition of ANSI/NETA *Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems*. Together, these standards provide the necessary specifications to test and commission electrical power equipment and systems. Furthermore, the NETA standards should be used together with other commissioning documents to expand the scope to include all of the applicable systems. Other systems may include mechanical, instrumentation, heating and refrigeration, and building systems.

The ANSI/NETA *Standard for Electrical Commissioning Specifications for Electrical Power Equipment and Systems* was developed for use by those responsible for testing and commissioning newly installed or retrofitted electrical power systems and equipment to guide them in specifying and performing the necessary inspections, tests, measurements, and system performance verifications to commission an electrical power system infrastructure. This document aids in ensuring safe, reliable operation of the electrical power equipment and systems. It is essential to commission newly installed and retrofitted electrical power equipment and systems. Additionally, acceptance testing of the equipment provides the baseline test results for maintenance programs and equipment trending, while commissioning verifies the electrical equipment and system meets the owner's project requirements and basis of design.

PREFACE

(This Preface is not part of American National Standard ANSI/NETA ECS-2015)

It is recognized by the Association that the term "commissioning" is not well defined in the industry. Although there are documents that exist in reference to commissioning, no standards exist that specifically address commissioning electrical power systems. It is the intent of this document to better define and specifically address the critical elements and requirements necessary in the commissioning of low-, medium-, and high-voltage electrical power systems.

The ANSI/NETA ECS *Standard for Electrical Commissioning Specifications for Electrical Power Equipment and Systems* is intended for use in all industries, whether it is a data center, a utility substation, and industrial facility, or any location that requires a comprehensive electrical power system commissioning process.

Suggestions for improvement of this standard are welcome. They should be sent to the InterNational Electrical Testing Association, 3050 Old Centre Avenue, Suite 102, Portage, MI 49024.

To help the user better understand and navigate more efficiently through this document, the following information is offered:

Notation of Changes
Since the 2015 edition of the ANSI/NETA ECS is the first of its kind, there are no changes noted in this document.

Document Structure
The ANSI/NETA ECS is divided into eleven separate and defined sections.

Section 1	General Scope
Section 2	Applicable References
Section 3	Qualifications
Section 4	Division of Responsibility
Section 5	General
Section 6	Commissioning Process
Section 7	Inspection and Commissioning Procedures
Section 8	Prime, Emergency, and Standby Power Systems (reserved)
Section 9	Thermographic Survey
Section 10	Transfer to Owner/Operator
Appendices	Various Informational Documents

Section 7 Structure
Section 7 is the main body of the document with specific information on what to do relative to the inspection and commissioning of electrical power equipment and systems. It is not intended that this document explain how to test specific pieces of equipment or systems, but rather, to detail the required steps and procedures for comprehensive commissioning of electrical power systems at a given voltage class.

Section 7 is divided into three subsections (7.1, Low-; 7.2, Medium-; and 7.3, High- and Extra-High Voltage Systems), which are in turn divided again into three subsections (A. Pre-Energization, B. Energization, and C. Post Energization).

If/When Applicable
The phrases "if applicable", "when applicable", and any variation thereof do not occur in this standard. This standard assumes that if devices or pieces of equipment are not present, they will not be subject to testing or verification.

Manufacturer's Instruction Manuals
It is important to follow the recommendations contained in the manufacturer's published data. Many of the details of a complete and effective testing and commissioning procedure can be obtained from this source.

Summary
The guidance of an experienced commissioning professional should be sought to develop a commissioning plan and lead the commissioning team. It is necessary to make an informed judgment for each particular system regarding how extensive a procedure is justified and required. The approach taken in these specifications is to present a comprehensive series of inspections, tests, and verifications applicable to most electrical systems. It is likely that in smaller electrical systems some of the inspections, tests, and verifications can be omitted.

Likewise, guidance of an experienced commissioning professional should also be sought when making decisions concerning the results of test data and performance results and their significance to the overall analysis of the device or system under test. Careful consideration of all aspects of test data, including manufacturer’s published data and recommendations, must be included in the overall assessment of the equipment or systems being commissioned.

The Association encourages comment from users of this document. Please contact the NETA office or your local NETA Accredited Company.

Standards Review Council
InterNational Electrical Testing Association

Timothy J. Cotter
Lorne Gara
Diane W. Hageman
Roderic L. Hageman
David Huffman
Ralph Patterson
Alan D. Peterson
Jayne Tanz
Ron Widup

CONTENTS

– This page intentionally left blank –

1. GENERAL SCOPE

1.1 Electrical Commissioning Specifications

1. 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 most recent edition of the ANSI/NETA *Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems* (ANSI/NETA ATS). The individual electrical components shall be subjected to factory and field tests, as required, to validate the individual components.

2. The purpose of these specifications is to assure that tested electrical systems are safe, reliable, and operational, are in conformance with applicable standards and manufacturers' tolerances, and are installed in accordance with design specifications.

3. The work specified in these specifications may involve hazardous voltages, materials, operations, and equipment. These specifications do not purport to address all of the safety issues associated with their use. It is the responsibility of the user to review all applicable regulatory requirements prior to the use of these specifications.

4. These specifications are specifically intended for application on electrical power equipment and systems. It is not the intent of these specifications to provide comprehensive details on the commissioning of mechanical equipment, mechanical instrumentation systems, and related components.