NEMA Standards Publication

ANSI C119.0-2015

American National Standard for Electric Connectors - Testing Methods and Equipment Common to the ANSI C119 Family of Standards

National Electrical Manufacturers Association

ANSI C119.0-2015

American National Standard for Electric Connectors— Testing Methods and Equipment Common to the ANSI C119 Family of Standards

Secretariat:

National Electrical Manufacturers Association

Approved: August 14, 2015
Published: October 1, 2015

American National Standards Institute, Inc.

NOTICE AND DISCLAIMER

The information in this publication was considered technically sound by the consensus of persons engaged in the development and approval of the document at the time it was developed. Consensus does not necessarily mean that there is unanimous agreement among every person participating in the development of this document.

ANSI standards and guideline publications, of which the document contained herein is one, are developed through a voluntary consensus standards development process. This process brings together volunteers and/or seeks out the views of persons who have an interest in the topic covered by this publication. While NEMA administers the process to promote fairness in the development of consensus, it does not write the document and it does not independently test, evaluate, or verify the accuracy or completeness of any information or the soundness of any judgments contained in its standards and guideline publications.

NEMA disclaims liability for any personal injury, property, or other damages of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, application, or reliance on this document. NEMA disclaims and makes no guaranty or warranty, express or implied, as to the accuracy or completeness of any information published herein, and disclaims and makes no warranty that the information in this document will fulfill any of your particular purposes or needs. NEMA does not undertake to guarantee the performance of any individual manufacturer or seller's products or services by virtue of this standard or guide.

In publishing and making this document available, NEMA is not undertaking to render professional or other services for or on behalf of any person or entity, nor is NEMA undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances. Information and other standards on the topic covered by this publication may be available from other sources, which the user may wish to consult for additional views or information not covered by this publication.

NEMA has no power, nor does it undertake to police or enforce compliance with the contents of this document. NEMA does not certify, test, or inspect products, designs, or installations for safety or health purposes. Any certification or other statement of compliance with any health- or safety-related information in this document shall not be attributable to NEMA and is solely the responsibility of the certifier or maker of the statement.

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. Moreover, no person shall have the right or authority to issue an interpretation of an 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

National Electrical Manufacturers Association
1300 North 17th Street, Suite 900, Rosslyn, Virginia 22209

Printed in the United States of America

Foreword (Neither this foreword nor any of the informative annexes is a part of American National Standard C119.0-2015.)

This standard describes electrical and mechanical tests that are common to the ANSI C119 family of standards, which are used to establish performance characteristics of connectors used to join aluminum-to-aluminum, aluminum-to-copper, or copper-to-copper bare and insulated conductors.

This document is the first publication of the ANSI C119.0 standard. It is not intended to be used in isolation from the other publications in the ANSI C119 family of product standards. It is intended that other ANSI C119 standards will make reference to C119.0 where a standardized test technique or procedure is required[1]. Consequently, there might be parts of ANSI C119.0 that do not fit coherently with the rest of the sections in the C119.0 document but are pertinent to the requirements of the other standards in the ANSI C119 family.

Included within the ANSI C119.0 standard:

a) Recommendations and requirements for instrumentation and equipment used for performing tests common to the ANSI C119 family of standards.

b) Two optional tests that were previously part of ANSI C119.4-2011: Optional Fault Current Test (Annex B) and Optional Corrosion Test (Annex C). The subcommittee has provided these optional performance tests as references in response to users who have requested guidance for these types of additional performance tests.

c) An alternate, accelerated current cycle test method, henceforth referred to as the current cycle submersion test (CCST). The CCST method differs from the traditional current cycle test (CCT) in that test conductors are rapidly cooled by immersion in chilled water at the beginning of the "current-OFF" cycle, and the test requires fewer total current-ON and current-OFF cycles. Comparative testing has demonstrated that the CCST method will provide essentially the same performance test results as the traditional CCT in fewer test cycles.

The techniques and methods presented in this standard were initially developed under the direction of the Transmission and Distribution Committee of the Edison Electric Institute (EEI). Tentative performance-type specifications for electrical characteristics were issued in joint report form in 1958 by a steering committee of EEI and an advisory committee of manufacturers on the aluminum conductor research project (EEI Pub. No. 59-70, *Tentative Specifications for Connectors for Aluminum Conductors*).

Experience gained from extensive trial use further confirmed the performance criteria and test conditions of the tentative specifications and led to the development of Standard TDJ 162 in October 1962 by a joint committee of EEI and the National Electrical Manufacturers Association (NEMA). TDJ 162 was subsequently superseded by ANSI C119.4.

The ANSI C119.0 Subcommittee of the Accredited Standards Committee on Connectors for Electric Utility applications, C119, in its continuing review of the publication, seeks out the views of responsible users that will contribute to the development of better standards. Suggestions for improvement of this standard are welcome. They should be sent to:

National Electrical Manufacturers Association
1300 North 17th Street, Suite 900
Rosslyn, Virginia 22209

[1] A copy of ANSI C119.0 will be provided, at no additional charge, with the purchase of any of the ANSI C119 product standards.

This standard was processed and approved for submittal to ANSI by the Accredited Standards Committee on Connectors for Electrical Utility Applications, C119. Committee approval of this standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the C119 Main Committee had the following members:

Harry Hayes, Chairperson
Michael Zaffina, Vice Chairperson
Paul Orr, Secretary

Organization Represented:	*Name of Representative:*
Electric Utility Industry	Enes Basic Michael Dyer Russell Hall Harry Hayes C. Cory Morgan Jesus Rodriguez Curt Schultz Gerald Wasielewski William Winge Thomas Wolfe Michael Zaffina
EPRI	John Chan Gary Sibilant
National Electric Energy Testing Research & Applications Center	Joe Goldenburg
National Electrical Manufacturers Association	Bryan Casenhiser Scott Casler Matt Cawood Peter Chan Seydou Diop Matt Gaertner David Hughes Kevin Jenkins Barry Johnson Eyass Khansa Ron Kmiecik Colin McCullough Alejandro Pineda Wayne Quesnel Gary Schrader

(continued on next page)

Organization Represented:	*Name of Representative:*
National Electrical Manufacturers Association (continued)	David Shibilia Ben Sparks Dan Stanton Carl Taylor David Thompson Justin Tuchscherer
CFE LAPEM	Giovanni Velazquez
Kinectrics Inc.	Dmitry Ladin Craig Pon
Powertech Labs Inc.	Chris Morton
Rural Utilities Service (RUS)	Trung Hiu
Tennessee Valley Authority	Joseph Graziano Ryan Stargel
Underwriters Laboratories	Kenneth McKinney
Other	Peter Bowers Waymon Goch Tip Goodwin Joe Renowden Carl Tamm Allen Wilcox

The C119.0 Subcommittee on Testing Methods and Equipment Common to the ANSI C119 Family of Standards, which developed this standard, had the following members at the time of its approval:

Chris Morton, Chairperson
Joe Goldenburg, Vice Chairperson
Paul Orr, Secretary

Enes Basic
Peter Bowers
Bryan Casenhiser
Scott Casler
Peter Chan
Constantino Dangelo
Michael Dyer
Chris Faust
Matt Gaertner
Waymon Goch
Joe Goldenburg
Tip Goodwin
Russell Hall
Douglas Harms
Harry Hayes
Trung Hiu
David Hughes
J.C. Mathieson
Colin McCullough
Kenneth McKinney
Chris Morton
Zsolt Peter
Doug Pilling
Alejandro Pineda
Craig Pon
Joe Renowden
Jesus Rodriguez
Gary Schrader
Curt Schultz
David Shibilia
Gary Sibilant
Ben Sparks
Paul Springer
Carl Tamm
Carl Taylor
Giovanni Velazquez
Richard Waidelich
Gerald Wasielewski
Allen Wilcox
William Winge
Michael Zaffina
James Zahnen

Contents

Figures

Tables

< This page intentionally left blank. >

1 Scope and Purpose

1.1 SCOPE

This standard covers methods and equipment for performing the connector qualification tests common to the ANSI C119 family of standards. Tests that are unique to only one ANSI C119 product standard are not covered in this document and are described in the applicable product standard.

1.2 PURPOSE

This standard provides guidance to organizations to perform tests required by the ANSI C119 standards and seeks to improve the inter-laboratory repeatability of the qualification of electrical connectors. Deviation from these guidelines shall be agreed upon between the purchaser and seller and documented in the test report.

1.3 DEFINITIONS

ambient temperature: Temperature in the test laboratory as measured by the temperature sensor specified in this document.

conductor: Conducting material used as a carrier of electric current.

connector: A device joining two or more conductors to provide a continuous electrical path.

control conductor: A conductor in the current cycle loop that serves as a reference for setting test current and monitoring temperature.

equalizer: A device installed in the test loop to ensure a point of equipotential in a stranded conductor.

input conductor: Conductor on the supply side of the connector.

output conductor: Conductor on the load side of the connector.

rated conductor strength: The tensile strength of a conductor determined in accordance with an applicable ASTM standard or as furnished by the conductor manufacturer for non-standard conductors.

thermal stability: A variation of not more than 2°C (3.6°F) between any two of three temperature readings taken at intervals not less than 10 minutes apart.

2 Reference Standards

This standard is used in conjunction with, but not limited to, the following standards in their latest edition:

ASTM B117 *Standard Practice for Operating Salt Spray (Fog) Apparatus*

ASTM E4-01 *Practices for Force Verification of Testing Machines*

IEEE 738 *Method for Determining the Temperature of Bare Overhead Conductor*

IEEE 837 *Standard for Qualifying Permanent Connections used in Substation Grounding*

3 Test Conditions

3.1 GENERAL

Connectors shall be installed and tested for mechanical performance in conditions meeting the following requirements:

