Approved as an American National Standard
ANSI Approval Date: September 23, 2019

ANSI/NEMA WC 51/ICEA P-54-440-2009 (R2014, R2019)

Ampacities of Cables Installed in Cable Trays

Prepared by:

Insulated Cable Engineers Association, Inc.
www.icea.net

Published by:

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

www.nema.org

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.

The National Electrical Manufacturers Association (NEMA) and the Insulated Cable Engineers Association, Inc. (ICEA) 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 persons who have an interest in the topic covered by this publication. While NEMA and ICEA administer the process and establish rules to promote fairness in the development of consensus, they do not independently test, evaluate, or verify the accuracy or completeness of any information or the soundness of any judgments contained in their Standards and guideline publications.

NEMA and ICEA disclaim liability for 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 and ICEA disclaim and make no guaranty or warranty, expressed or implied, as to the accuracy or completeness of any information published herein, and disclaim and make no warranty that the information in this document will fulfill any of your particular purposes or needs. NEMA and ICEA do not undertake to guarantee the performance of any individual manufacturer’s or seller’s products or services by virtue of this Standard or guide.

In publishing and making this document available, NEMA and ICEA are not undertaking to render professional or other services for or on behalf of any person or entity, nor are NEMA and ICEA 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 and ICEA have no power, nor do they undertake to police or enforce compliance with the contents of this document. NEMA and ICEA do 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 ICEA and is solely the responsibility of the certifier or maker of the statement.

Foreword

This Standards publication for *Ampacities of Cables Installed in Cable Trays* (ICEA P-54-440, NEMA WC 51-2019) was developed by the Insulated Cable Engineers Association, Inc. (ICEA) and approved by the National Electrical Manufacturers Association (NEMA). It supersedes WC 51-2014.

ICEA/NEMA Standards are adopted in the public interest and are designed to eliminate misunderstanding between the manufacturer and the user and to assist the user in selecting and obtaining the proper product for their particular need. Existence of an ICEA/NEMA Standard does not, in any respect, preclude the manufacture or use of products not conforming to the Standard. The user of this Standard is cautioned to observe any health or safety regulations and rules relative to the manufacture and use of cable made in conformity with this Standard.

Requests for interpretation of this Standard must be submitted in writing to:

Insulated Cable Engineers Association, Inc.,
www.icea.net

An official written interpretation will be provided. ICEA will welcome any suggestions on ways to improve this Standard.

< This page intentionally left blank. >

CONTENTS

Scope

This Standards Publication covers the ampacity ratings for 600-15,000 volt solid dielectric cables installed in cable trays. Ampacity ratings are tabulated for single conductor cables, triplexed assemblies of single conductor cables, and three-conductor cables incorporating an overall jacket.

Ampacities have been tabulated for the cable constructions and the operating conditions normally encountered for tray applications. Correction factors to adjust the tabulated values to better reflect specific conditions are provided. These include adjustments to account for ambient and operating temperatures, cable construction, tray covers, and diversification of the cable loading.

This Standard is intended primarily for use by the utility industry. It is not intended for use where compliance with the *National Electrical Code®* or other regulations is mandatory.

History

Ampacity tables for cables in trays were published in the Insulated Power Cable Engineers Association Publication No. P-33-440, April 2, 1959 (IPCEA is currently known as ICEA). It assumed a load diversity but did not specifically define the diversity. The demands of modern generating plants required a more precise definition of operating conditions for the determination of cable ampacities.

Experimental work with various cables and the loading of trays by J. Stolpe[1] and the theory developed by Stolpe, Underwriters Laboratories Inc., Lee,[2,] and ICEA Publication P-46-426, IEEE S-135 *Power Cable Ampacities*, 1962 Edition provided a more accurate means of calculating ampacities of cables in trays. A joint committee of IPCEA and IEEE Insulated Conductors Committee utilized this work in preparing the ampacity tables. They were published in the IPCEA/NEMA Standards Publication for *Ampacities of Cables in Open-top Cable Trays,* IPCEA Publication No. P-54-440, NEMA Standards Publication No. WC 51-1972. They superseded the factors in Table B for cables without maintained spacing in the IPCEA "Factors for Calculating Ampacities of Cables Installed in Ladder Supports, Trays, and Troughs," P-33-440, April 2, 1959. Table A of that publication covering factors for cables with maintained spacing was not affected.

The 1975 edition of the IPCEA/NEMA Standards Publication was expanded to cover 15 kV cables and includes a great many editorial corrections that clarify the 1972 document. The document was revised in April 1976 and again in August 1979. NEMA reaffirmed the document on November 20, 1980. In October 1984, a correction was made in the earlier Appendix D and was included in that edition.

The Members of IEEE-IPCEA Joint Committee at the time of the initial writing were: R. C. Waldron, Chairman, D. A. Costello, E. Finch, E. L. Kolmorgen, M. J. Koulopoulos, R. H. Lee, R. A. Peterson, D. A. Silver, and J. Stolpe.

The extended information contained in this revision was made possible through recent theoretical and experimental work by W. Z. Black and B. L. Harshe.[3, 4] This edition has been expanded to include tray fill depths up to four inches and adjustment factors to account for tray covers and load diversity. In addition, the tables have been revised to reflect current cable design practices and conductor sizes through 2000 kcmil inclusive.

---

[1] IEEE Transaction Paper 70 TP 557 PWR, *Ampacity for Cables in Randomly Filled Trays,* J. Stolpe, 1970
[2] IEEE Transaction Paper 71 TP 543 PWR, *Ampacity for Multiconductor Cables in Trays,* R. Lee, 1971
[3] IEEE Transactions on Power Delivery Vol. 9 No. 4, Oct. 1994, *Ampacity of Cables in Single Open-Top Cable Trays,* B. Harche & W. Black
[4] IEEE Transactions on Power Delivery Vol. 12 No. 1, Jan. 1997, *Ampacity of Cables in Single Covered Trays,* B. Harche & W. Black