NEMA Standards Publication

ANSI C136.30-2015

American National Standard for Roadway and Area Lighting Equipment - Pole Vibration

National Electrical Manufacturers Association

ANSI C136.30-201

American National Standard for Roadway and Area Lighting Equipment— Pole Vibration

Secretariat:

National Electrical Manufacturers Association

Approved January 13, 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.

American National Standards Institute, Inc. (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 and establishes rules 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 the American National Standards Institute, Inc. (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 significantly more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and 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 they have 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, Inc. does not develop standards, and will under 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, Inc. 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, Inc., 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, Inc.

Published by

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

Printed in the United States of America

Foreword

At the time this standard was approved, the ANSI C136 committee was composed of the following members:

Alabama Power Company
American Electric Lighting
Caltrans
Ceravision
City of Kansas City, Missouri
City of Los Angeles, Bureau of Street Lighting
Cree, Inc.
Duke Energy
Duke Energy Florida
Eaton's Cooper Lighting
Edison Electric Institute
EPRI
EYE Lighting International of N.A., Inc.
Florida Power & Light Company
FP Outdoor Lighting Controls
FRE Composites (2005) Inc.
GE Lighting Systems
Georgia Power Company
Gulf Power Company
Hapco Aluminum Pole Products
Holophane, An Acuity Brands Company
Hubbell Lighting, Inc.
Inovus Solar
Intelligent Illuminations Inc.
Intertek USA, Inc.
JEA
Kauffman Consulting, LLC
LED Roadway Lighting Ltd.
LITES
LUXIM Corp.
Mississippi Power
National Grid
OSRAM SYLVANIA Inc.
Philips HADCO
Philips Lumec
PNNL-Battelle
ROAM/DTL
SELC Lighting
Sensus Metering
Silver Spring Networks
Sollux Consulting
SouthConn Technologies, Inc.
Stresscrete/King Luminaire
TE Connectivity
Utility Metals Division of Fabricated Metals, LLC
Valmont Composite Structures
Valmont Industries, Inc.
Vamas Engineering and Consultants
Xcel Energy

Contents

Figures

< This page intentionally left blank. >

1 Scope

This guide covers the minimum vibration withstand requirements and testing procedures for poles used in roadway and area lighting. The guide is intended for poles of 50-ft mounting height and under.

2 Normative References

This standard incorporates by reference provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed below. For undated references, the latest edition of the publication referred to applies (including amendments).

ANSI C136.31-2010, *For Roadway and Area Lighting Equipment—Luminaire Vibration*

AASHTO LTS-5, *AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*

FHWA NHI 05-036, *Guidelines for the Installation, Inspection, Maintenance and Repair of Structural Supports for Highway Signs, Luminaires, and Traffic Signals*

3 Definitions

Critical Damping: the minimum damping that will allow a displaced system to return to its initial position without oscillation.

Damping: any effect that reduces the amplitude of oscillations in a vibrating system. This is due to dissipation of energy with time (or number of cycles). Its magnitude is usually expressed as Damping Ratio or Percentage of Critical Damping. This ratio is often termed Damping Factor.

Damping Variables: Damping factors on a pole structure tend to increase as frequency increases and as amplitude of the vibration increases. The damping resistance occurs between several objects moving relative to each other.

EPA (Effective Projected Area): a calculated value based on the cross-sectional area of an object and its drag coefficient, used in determining loads on surfaces induced by winds. The drag coefficient is a function of the wind-facing surface contour for the object. The EPA can be calculated from the object's dimensions and applying an approximate drag coefficient based on its shape, or it can be calculated from load measurements made in a wind tunnel on the object.

Excitation: the external force that causes a system to respond. When the excitation frequency corresponds to a natural frequency, the system will vibrate at that frequency generally at an amplitude greater than that of the excitation.

Fatigue: the failure of materials due to alternating stress loads. Fatigue occurs over time when the amplitude and quantity of alternating stresses exceeds the endurance limit of the material.

Frequency: a single motion from one extreme position to an opposite position and back, passing through the neutral position twice, is called a cycle. The number of cycles per second is known as the frequency of oscillation. Frequency is expressed in Hertz (Hz); a frequency of 1 Hz means there is one cycle or oscillation per second.

Friction Damping: a rubbing action between the objects. The damping is relatively constant, except at some low force value where the relative motion will stop (breakaway force); the damping will then be zero.

Fundamental Mode of Vibration: The fundamental mode of vibration for a system is the mode having the lowest natural frequency.

