A NEMA Lighting Systems Division Document
NEMA LS 20022-2019 (R2023)

(Previously LSD 21-2019)

End-of-Life Operation of Small Diameter (5/8 inch Diameter or Less) Pin-based Fluorescent Lamps

Prepared by:
Lamp Section
Ballast Section
Luminaire Section

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

www.nema.org

Approved August 17, 2023

Published:October 20,2023

The opinions expressed in this statement represent the consensus views of the member companies of the Lighting Systems Division of the National Electrical Manufacturers Association. The members of the Lighting Systems Division manufacture indoor and outdoor lamps, which include incandescent, fluorescent, light emitting diode, and solid-state lamps, lighting fixtures, and lamp ballasts.

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) 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.

Contents

Foreword ii
1 Introduction 1
2 References 1
3 Standardization Activities 1
4 Recommendations 2
5 Questions and Answers with Regard to End-of-life Operation 2

Foreword

NEMA technical publications are subject to periodic review. They are revised frequently to reflect user input and to meet changing conditions and technical progress. Proposed revisions to this technical publication should be submitted to:

NEMA Technical and Industry Affairs Department
National Electrical Manufacturers Association
1300 North 17th Street, Suite 900
Rosslyn, VA 22209

Note: The user's attention is called to the possibility that compliance with this standard could require use of an invention covered by patent rights.

By publication of this standard, no position is taken with respect to the validity of any such claim(s) or of any patent rights in connection therewith. If a patent holder has filed a statement of willingness to grant a license under these rights on reasonable and non-discriminatory terms and conditions to applicants desiring to obtain such a license, then details may be obtained from the Secretary.

<This page is intentionally left blank.>

1 Introduction

In almost all fluorescent lighting systems, variations in electrical and thermal parameters occur over time. In the present generation of large diameter fluorescent lamp-ballast systems, electrical and thermal variations can be tolerated due to the large diameter of the lamp.

However, with small diameter pin-based fluorescent lamps (both single-based and double-based with 5/8 inch diameter or less), there is less ability for the lamp and lampholder to tolerate electrical and thermal variations. Excessive electrical or thermal variation in small diameter fluorescent lamps can produce operational problems at the end of lamp life. One type of lamp failure is a broken or deactivated cathode. This can create an incorrect current operating condition producing high local heating that, if allowed to continue, may crack the lamp glass, or overheat the lamp base or lampholder.

NEMA manufacturers are aware that in some situations an odor or emission may occur when the base, base cement within the lamp, or lampholder is overheated. In some situations, the plastic lamp base material or lampholder may deform. The plastics used by lamp and lampholder manufacturers are specifically chosen for their engineering properties so that combustion does not occur in such situations. NEMA manufacturers are not aware of any instances where combustion has resulted from this type of lamp failure. NEMA lamp and ballast manufacturers are working to resolve end-of-life performance issues and do not consider this type of lamp failure to represent a hazard.

2 References

ANSI

C78.81	*American National Standard for Electric Lamps—Double-Capped Fluorescent Lamps—Dimensional and Electrical Characteristics*
C78.901	*American National Standard for Electric Lamps—Single-Based Fluorescent Lamps—Dimensional and Electrical Characteristics*
C82.11	*American National Standard for Lamp Ballasts—High Frequency Fluorescent Lamp Ballasts*

IEC

60929	*AC and/or DC-supplied electronic control gear for tubular fluorescent lamps – Performance requirements*
61347-2-3	*Lamp control gear – Part 2-3: Particular requirements for a.c. and/or d.c. supplied electronic control gear for fluorescent lamps*

3 Standardization Activities

To ensure proper performance of systems using small diameter fluorescent lamps, NEMA recommends that new installations of these lamps use only ballasts that include an end-of-life protection circuit. American National Standards Institute (ANSI) Accredited Standards Committees ASC C78 and ASC C82 have the standards for lamps and ballasts respectively. The ANSI C82.11 standard includes information on the testing protocol and the maximum allowable wattage or current limits for a failed small diameter fluorescent lamp. In addition, ANSI C78.81 and C78.901 standards require all high frequency electronic ballasts to have suitable measures in the circuit to address end-of-life operation of fluorescent lamps having the diameter of a T5 lamp or smaller. Harmonized portions of International Electrotechnical Commission (IEC) standards, IEC 60929 and IEC 61347-2-3, have also been published.