



ANSI C78.375A-2014 (R2020)

American National
Standard for Electric
Lamps — Fluorescent
Lamps—Guide for
Electrical Measures



National Electrical Manufacturers Association
1300 North 17th Street, Suite 900 • Rosslyn, VA 22209
www.NEMA.org





ANSI C78.375A-2014 (R2020)
Revision of ANSI C78.375-2014

*American National Standard for Electric Lamps—
Fluorescent Lamps—Guide for Electrical Measures*

Secretariat:

National Electrical Manufacturers Association

Approved: January 17, 2020

American National Standards Institute

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, expressed 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 Standard 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 to reaffirm, revise, or withdraw this Standard no later than five years from the date of approval. 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**

© 2020 National Electrical Manufacturers Association. All rights, including translation into other languages, reserved under the Universal Copyright Convention, the Berne Convention for the Protection of Literary and Artistic Works, and the International and Pan American copyright conventions.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

Printed in the United States of America

Foreword [This foreword is not part of American National Standard C78.375A-2014 (R2020).]

Suggestions for improvement of this Standard are welcome. They should be sent to the Secretary, ASC C78, National Electrical Manufacturers Association, 1300 North 17th Street, Suite 900, Rosslyn, Virginia 22209.

This Standard was processed and approved for submittal to ANSI by Accredited Standards Committee on Electric Lamps, C78. Approval of the Standard is not meant to imply that all Committee Members voted to approve it.

CONTENTS

Foreword	ii
1 Scope	1
1.1 Patent Disclaimer.....	1
2 Normative References.....	1
3 Supply Voltage Characteristics.....	1
4 Ambient Conditions for Lamp Measurements.....	2
5 Ballast	2
6 Circuits.....	2
6.1 Measurement Circuit.....	2
6.2 Instrument Connections.....	2
6.4 Instant-Start Lamps	4
6.5 Rapid-Start Lamps.....	4
6.6 Calibration of Cathode Heating Transformers.....	5
6.7 Circuit Grounding.....	6
7 Lamp Connections.....	6
7.1 Preheat-Start Lamps.....	6
7.2 Instant-Start and Cold-Cathode Lamps	6
7.3 Rapid-Start Lamps.....	6
8 Lamp Stabilization	7
8.1 Linear, Circular and U-Shaped Lamps	7
8.2 Single-Based Compact Lamps	7
8.2.1 Lamp Circuit Transfer	7
8.3 Abnormal Behavior	8
8.4 Seasoning.....	8
9 Electrical Instruments	8
10 Method of Reference Circuit Measurement of Wattage, Voltage, and Current.....	8
11 Method of Cold and Hot Resistance Measurement	9
11.1 Equipment Required	9
11.2 Connections	9
11.3 Established Conditions for Measurements	9
11.4 Measurement	9
11.4.1 Preconditioning	9
11.4.2 Cold Resistance R_c Measurement	10
11.4.3 Hot Resistance R_h and R_h/R_c Ratio Measurement.....	10

Figures

Figure 1(a-f) Measurement Circuit for Fluorescent Lamps 4

Figure 2 Circuit for the Calibration of Cathode Transformers 5

1 Scope

This Standard describes the procedures to be followed and the precautions to be observed in obtaining uniform and reproducible measurements of the electrical characteristics of fluorescent lamps under Standard conditions when operated on alternating current (ac) circuits. These methods are applicable both to lamps having hot cathodes—switch-start (preheat-start), rapid-start (continuously heated cathodes), or instant-start— and to lamps of the cold-cathode variety.

The electrical characteristics usually measured are lamp current, lamp voltage, and lamp power. In the case of rapid-start lamps, the power measurements may include both the arc watts¹ and the cathode watts. Total lamp power is the sum of arc watts and cathode watts. The methods noted in this Standard apply to fluorescent lamps operated at common power-line frequencies (50 and 60 Hz) or high frequency.

1.1 Patent Disclaimer

At the time of publication, it is possible that some of the elements of this document may be the subject of patent rights. When this Standard was approved for publication, the Accredited Standards Committee C78 and the National Electrical Manufacturers Association (NEMA) did not know of any patent applications, patents pending, or existing patents. ASC C78 shall not be held responsible for identifying any or all such patent rights.

2 Normative References

The following publications contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All Standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the publications indicated below.

ANSI C78.81, *Double capped fluorescent lamps – Dimensional and electrical characteristics*

ANSI C78.901, *Single based fluorescent lamps – Dimensional and electrical characteristics*

ANSI C82.3, *Reference Ballasts for Fluorescent Lamps*

3 Supply Voltage Characteristics

The supply voltage shall be equal to the rated voltage of the reference ballast. During periods of stabilization, the supply shall be stable within $\pm 0.5\%$. This tolerance is reduced to $\pm 0.2\%$ during measurement.

The wave shape of the supply voltage shall be a sine wave and shall have a wave shape such that the root-mean-square (rms) summation of the harmonic components shall not exceed 3% of the fundamental for all conditions that occur during the measurement.

Note—This implies that the source of the supply should have sufficient power, and that the supply circuit should have sufficiently low impedance, compared with the ballast impedance.

¹Arc watts is the term used for the power consumed by the discharge only and does not refer to any power that may be supplied to the lamp cathodes from a separate voltage source.