

NEMA Standards Publication

ANSI C78.1501-2016

---

Electric Lamps —  
Tungsten-Halogen Lamps  
with G22 Bases and  
63.5 mm LCL





**ANSI C78.1501-2016**

*American National Standard for Electric Lamps—  
Tungsten-Halogen Lamps with  
G22 Bases and 63.5 mm LCL*

Secretariat:

**National Electrical Manufacturers Association**

Approved: August 23, 2016

**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, 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 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. An American National Standard implies a consensus of those substantially concerned with its scope and provisions. 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 existence of an American National Standard does not in any respect preclude anyone, whether s/he has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards. It is intended as a guide to aid the manufacturer, the consumer, and the general public.

The American National Standards Institute, Inc., 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, Inc. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on this title page.

**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 17<sup>th</sup> Street, Suite 900**  
**Rosslyn, Virginia 22209**

© 2016 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 prior written permission of the publisher.

Printed in the United States of America

## CONTENTS

Foreword .....	iii
1 Scope .....	1
2 Normative References .....	1
3 Lamp Designations .....	1
4 Physical Characteristics.....	2
5 Restrictions .....	3
6 Test Procedures .....	4
7 Information for Luminaire Design .....	5
Annex A: Normative .....	6
Annex B: Informative References.....	7

**Foreword** (This foreword is not part of ANSI C78.1501-2016.)

Suggestions for improvement of this standard should be submitted to the Secretariat C78, National Electrical Manufacturers Association, 1300 North 17<sup>th</sup> Street, Suite 900, Rosslyn, Virginia 22209.

This standard was processed and approved by Accredited Standards Committee on Electric Lamps, C78. Committee approval of the standard does not necessarily imply that all committee members voted for that approval.

**<This page left blank intentionally.>**

## 1 Scope

This standard defines the dimensional limits and other physical characteristics required to ensure interchangeability and assist in the proper application of a specific category of lamps. This category is tungsten-halogen lamps with G22 bases and 63.5 mm (2½ in.) nominal light center length. Lamps of various design voltages are included.

Lamps with the specifications listed in this standard are intended for stage and studio applications.

The grouping of lamps in this standard is based on general physical characteristics. It does not imply that the lamps listed are interchangeable with each other in a particular application.

Other tungsten-halogen lamps for stage and studio applications are described in standards listed in Annex B.

Certain lamps in this standard are compatible with IEC 60357.

## 2 Normative References

The following standards contain provisions that, 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 standards indicated below.

ANSI C78.370-1997 (R2011)	<i>American National Standard for Method of Designation for Electric Lamps—Photographic, Stage and Studio</i>
ANSI/IEC C78.682-1997 (R2016)	<i>American National Standard for Electric Lamps—Standard Method of Measuring the Pinch Temperature of Quartz Tungsten-Halogen Lamps</i>
ANSI C78.1450-1983 (R2011)	<i>American National Standard for Electric Lamps, Incandescent Projection Lamps—Method for Life Testing</i>
ANSI C78.79-2014	<i>American National Standard for Electric Lamps—Nomenclature for Envelope Shapes Intended for Use with Electric Lamps</i>
ANSI C81.61-2017	<i>American National Standard for Electrical Lamp Bases—Specifications for Bases (Caps) for Electric Lamps</i>
ANSI C81.63-2007 (R2014)	<i>American National Standard for Gauges for Electric Lamp Bases and Lampholders</i>

## 3 Lamp Designations

### 3.1 Marking

Lamps shall be marked with the relevant code in accordance with the photo lamp designation system, ANSI C78.370.

### 3.2 Durability

The area of the marking of an unused lamp shall withstand, maintaining legibility, the application of a rubbing test. This test involves rubbing by hand with a smooth cloth, dampened with water, for a period of 15 seconds.

#### **4 Physical Characteristics**

##### **4.1 Bulb Designations**

Bulb designations are defined in ANSI C79.1.

In this standard, bulbs are described by metric designations, with customary designations in parentheses.

##### **4.2 Base Specification**

Finished lamps employing the G22 base shall comply with the detailed base requirements given in ANSI C81.61. Base gauging procedures are given in ANSI C81.63.

### **4.3 Lamp Characteristics**

Physical, electrical, and other characteristics of standard lamps are shown in Table 1, with tolerances as appropriate.

### **4.4 Dimensions**

**4.4.1** The lamp space drawing (Figure 1) shows the maximum limits of the space that may be occupied by any part of a bulb. The space shown will accommodate the longest and shortest lamps with maximum bulb diameters, and maximum bulb excursion with respect to the base axis. A typical bulb is shown as a dashed line within the maximum space. The following general conditions apply to the construction of these drawings:

- a. Straight lines are used as much as possible to simplify the outline; all compromises with the actual space are in excess of the actual space required.
- b. All excursions of a lamp bulb are shown relative to a fixed-position base.
- c. Bulb “eccentricity” with respect to the base axis is a combination of allowances for angular tilt and lateral displacement.
- d. The base shown in the drawing represents a typical form. The essential dimensions are controlled by the “Go” gauge for G22-based lamps described in ANSI C81.63.
- e. All dimensions are in millimeters (mm) unless otherwise specified.

**4.4.2** The light source dimensions—width (W), height (H), and thickness (T)—in Table 1, define a maximum size volume centered on the light center length and base axis within which all luminous parts of the filament are located. This volume accounts for all positions of the filament. Actual filament size may be significantly smaller than the defined light source volume.

## **5 Restrictions**

### **5.1 Operating Positions**

Lamp types in this standard may operate properly in any position, or they may be restricted as to position. Such restrictions are indicated in the Operating Position column of Table 1.

## **5.2 Seal Temperature**

In the lamps covered by this standard, the metal-to-envelope seal is intended for operation at temperatures not to exceed 400°C.

## **5.3 Bulb Wall Temperature**

A lamp's bulb wall temperature shall be maintained at about 250°C for proper operation of the halogen cycle. An upper limit of approximately 900°C is recommended for maintaining the integrity of fused silica bulbs.

## **5.4 Shielding**

A protective shield shall be provided relevant to the following cautionary notice.

To assure maximum safety during handling and use of the subject lamps, observe the following notices:

- a. Tungsten-halogen lamps operate at high temperature and at internal gas pressures above atmospheric pressure. Consequently, a lamp could shatter. Certain lamps may also emit some amount of ultraviolet radiation. Therefore, a suitable protective shield, screening technique, or both shall be used with the luminaire to protect people and surroundings from both hazards.
- b. Always read and observe the information contained in the lamp manufacturer's caution notice.

## **6 Test Procedures**

### **6.1 Life**

Lamps shall be tested in open racks or fixtures in their specified operating position with cooling to maintain the bulb and seal temperature limits. Suggested test cycles and additional testing procedures are defined in ANSI C78.1450. It should be noted that life-test results from an open rack test procedure may not be representative of lamp life in luminaires or projection equipment.

Consult the lamp manufacturer for specific test criteria.

### **6.2 Seal (Pinch) Temperature**

The measurement procedure is defined in ANSI/IEC C78.682.

### **6.3 Operating Temperature**

Standard methods of measuring other lamp operating temperatures (bulb and base) are under consideration.

## **7 Information for Luminaire Design**

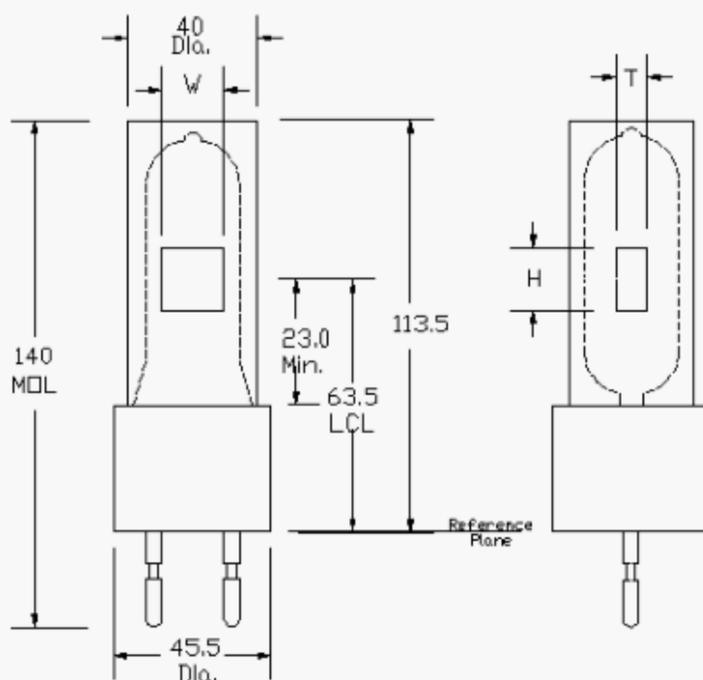
Proper luminaire design must take into account the several aspects of lamp restrictions mentioned in section 5, operating position, seal temperature, bulb wall temperature, and shielding.

## Annex A Normative

**Table 1—Lamp Characteristics**

BT35 (BT11) or T35 (T11) and Smaller Bulbs G22 Base 63.5 mm Nominal Light Center Length 140 mm MOL with C13 or C13D Filaments										
ANSI Designation	Rated Wattage (W)	Rated Voltage (V)	Nominal Bulb Size	Rated <sup>1)</sup> Avg Life (Hr)	Correlated Color Temp. (K) ( $\pm 100K$ )	Light Source <sup>2)</sup> Dimensions (mm)			Filament Configuration	Operating Position
						W	H	T		
EGN	500	120	T19(T6)	100	3200	16.5 15.5	17.5 17.5	5.0 8.1	C13 C13D	BDTH <sup>3)</sup> BDTH <sup>3)</sup>
FKG	650	120	T25(T8)	100	3200	17.0	18.0	5.0	C13	BDTH <sup>3)</sup>
FKH	650	220,230, 240	T25(T8)	100	3200	19.0 14.0	20.0 15.5	5.0 6.5	C13 C13D	BDTH <sup>3)</sup> BDTH <sup>3)</sup>
EGR	750	120	T22(T7)	200	3200	17.5 15.8	20.0 17.5	5.0 8.1	C13 C13D	BDTH <sup>3)</sup> BDTH <sup>3)</sup>
EGT	1000	120	T22(T7)	200	3200	21.0 15.5	20.0 19.5	5.0 9.1	C13 C13D	BDTH <sup>3)</sup> BDTH <sup>3)</sup>
FKJ	1000	220,230, 240	BT35 (BT11) T25(T8)	200	3200	23.0 18.5	21.0 18.5	5.0 7.5	C13 C13D	BDTH <sup>3)</sup> BDTH <sup>3)</sup>

Notes:  
 1) Lamp manufacturers' published values of rated life may vary.  
 2) See definition of light source in section 4.4.2.  
 3) Base down to horizontal



**Figure 1**  
**Space limits for Tungsten-Halogen Stage/Studio Lamps BT35 (BT11) or T35 (T11) and Smaller Bulbs, G22 Medium Bipost Base, 63.5 mm Nominal Light Center Length (LCL), 140 mm Maximum Overall Length (MOL)**

## **Annex B Informative**

### **Informative References**

*ANSI C78.1500-2001 American National Standard for Tungsten Halogen (TH) Lamps with a Light Center Length (LCL) of 89 mm (3½ in.)*

*ANSI C78.1503-2001 American National Standard for Tungsten Halogen (TH) Lamps with G9.5 Bases and 60.5 mm Light Center Length (LCL)*

*ANSI C78.1504-2001 American National Standard for Tungsten Halogen (TH) Lamps with P28 Bases and 55.5 mm Light Center Length (LCL)*

*ANSI C78.1505-2001 American National Standard for Tungsten Halogen (TH) Lamps with G38 Bases and 127 mm Light Center Length (LCL)*

*IEC 60357:2002 Tungsten Halogen Lamps (Non-Vehicle)—Performance Specifications*

§

**NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION**  
**1300 NORTH 17TH STREET, SUITE 900 • ROSSLYN, VA 22209**  
[www.NEMA.org](http://www.NEMA.org)



**TO ORDER ADDITIONAL NEMA STANDARDS VISIT**  
**[WWW.GLOBAL.IHS.COM](http://WWW.GLOBAL.IHS.COM) OR CALL 1-800-854-7179/1-303-397-7956**

