



UL 1993

STANDARD FOR SAFETY

Self-Ballasted Lamps and Lamp
Adapters

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UL Standard for Safety for Self-Ballasted Lamps and Lamp Adapters, UL 1993

Fifth Edition, Dated January 27, 2017

Summary of Topics

This revision of ANSI/UL 1993 dated March 26, 2021 includes the following changes in requirements:

- **Copper-alloy screw bases and moist ammonia air stress cracking test option for copper alloys; [6.1.2](#), [Table 6.0A](#), [Table 8.1](#), [8.20](#) and [Table 8.3](#)**
- **Maximum conductive length of Edison screw bases; [6.1.5](#), [6.1.6](#), [Table 6.0B](#), [Figure 6.1](#) and [8.10A](#)**
- **Evaluation of tack-soldered electrical connections; [6.2.2](#) and [8.21](#)**
- **Drop impact test determination for severely damaged lamps; [SA8.8.2](#), [SA8.8.4](#), [Figure SA8.0](#), [Table SA10.1](#) and [SA10.4.3](#)**
- **Thickness of metal G5 and G13 lamp bases; [5.1.3](#), [6.1.7](#), and [6.1.7](#)**
- **Lamps with movable joints; [5.5](#), [Table 8.1](#), [8.22](#), [8.23](#) and [Table 8.4](#)**
- **Revision to Type A lamps – Revisions to HF test source; [SC4.1.2](#), [SC4.1.3](#) and [SC4.1.4](#)**
- **Additional requirements for evaluating LED lamps as direct replacements for specific high intensity discharge (HID) lamps; [2.1](#) and Supplement [SD](#)**
- **Type A/B tube lamp markings; [SA10.4.4](#), [SA10.2.8](#) and [Table SA10.1](#)**
- **Linear LED lamps; [SA1.6](#), [SA5.4.2](#), [SA8.5.3](#), [SA8.5.6](#), [SA3.10A](#), [SA6.14A](#), [SA8.24](#) and [SA8.5.5](#)**
- **Temperature Test - LED Lamps; [SA8.5.6](#) and [SA8.5.7](#)**
- **Addition of Supplement SE - Special Use Lamps; [1.6](#), [Table 5.2](#), and Supplement [SE](#)**
- **New Test, Construction, and Marking requirements for LED Lamps with Integral Rechargeable Batteries; Supplement [SF](#)**
- **Miscellaneous editorial updates; [4.5.1.2](#), [SA6.13.4](#), [SA8.19.3](#)**

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated August 9, 2019 and October 9, 2020.

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Association of Standardization and Certification
NMX-J-578/1-ANCE
Third Edition



CSA Group
CSA C22.2 No. 1993-17
Third Edition



Underwriters Laboratories Inc.
UL 1993
Fifth Edition

Self-Ballasted Lamps and Lamp Adapters

January 27, 2017

(Title Page Reprinted: March 26, 2021)



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This ANSI/UL Standard for Safety consists of the Fifth Edition including revisions through March 26, 2021. The most recent designation of ANSI/UL 1993 as an American National Standard (ANSI) occurred on March 26, 2021. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface.

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Preface

This is the harmonized ANCE, CSA Group, and UL standard for Self-Ballasted Lamps and Lamp Adapters. It is the third edition of NMX-J-578/1-ANCE, the third edition of CSA C22.2 No. 1993, and the fifth edition of UL 1993. This edition of CSA C22.2 No. 1993 supersedes the previous edition published in 2012. This harmonized standard has been jointly revised on March 26, 2021. For this purpose, CSA Group and UL are issuing revision pages dated March 26, 2021, and ANCE is issuing a new edition dated March 26, 2021.

This harmonized standard was prepared by the Association of Standardization and Certification (ANCE), CSA Group, and Underwriters Laboratories Inc. (UL). The efforts and support of the Technical Harmonization Committee for Self-Ballasted Lamps, of the Council of the Harmonization of Electrotechnical Standards for the Nations of the Americas (CANENA), are gratefully acknowledged.

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

The present Mexican standard was developed by the CT 34 – Iluminación from the Comité de Normalización de la Asociación de Normalización y Certificación, A.C., CONANCE, with the collaboration of the lamps and ballasts manufacturers and users.

This standard was reviewed by the CSA Integrated Committee on Lighting Products, under the jurisdiction of the CSA Technical Committee on Consumer and Commercial Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee.

In Canada, for general information on the Standards of the Canadian Electrical Code, Part II, see the preface to CAN/CSA-C22.2 No. 0.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specific number is to be considered a minimum quantity.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

Level of Harmonization

This standard is published as an equivalent standard for CSA Group and UL and a proposed equivalent standard for ANCE.

An equivalent standard is a standard that is substantially the same in technical content, except as follows. Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been

identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

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For CSA Group, the text, figures, and tables of International Electrotechnical Commission Publication 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, copyright 2011, are used in this standard with the consent of the International Electrotechnical Commission.

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1 Scope

1.1 These requirements are intended to cover both self-ballasted lamps and self-ballasted lamp adapters rated 120 to 347 V AC nominal for connection to screw-base, pin-base, or recessed single contact (RSC or R7) lampholders. These devices are intended for use in accordance with the National Electrical Code, ANSI/NFPA 70, and the Canadian Electrical Code Part I, CSA C22.1, in non-hazardous locations, and the Instalaciones Eléctricas (utilización), NOM-001-SEDE.

1.2 These devices incorporate resistance, reactance, or electronic (solid-state) type ballasts or power supplies. These devices employ various lamp technologies including, but not limited to, incandescent, fluorescent, high-intensity discharge lamps, light-emitting diodes.

1.3 These requirements also include Supplemental Requirements for Light-Emitting Diodes (LED), Supplement [SA](#), for:

- a) Self-contained LED lamps, rated 120 to 347 V AC nominal for connection to screw-, pin-base, and recessed single contact (RSC or R7) lampholders,
- b) Lamps for replacement of an ANSI standardized fluorescent lamp, and consisting of light-emitting-diode (LED) lamp technologies, with control circuitry, and a driver or power supply. The LED driver and control circuitry will be either integral with the lamp or remote from the lamp, and
- c) Component LED lamps, with or without control circuitry, an ANSI base other than bases mentioned in (a), for connection to LED driver having a low voltage output, such as replacement for tungsten-halogen, MR11 and MR16 shaped lamps.

1.4 This standard does not apply to medium-to-medium base (E26) fittings that incorporate controls such as photocells, motion detectors, radio controls, or dimmers covered by other standards.

1.5 These devices are not intended for use with emergency exit fixtures or emergency exit lights.

1.6 Self-ballasted lamps that emit electromagnetic energy (light) outside the 400 – 700 nm range shall additionally comply with Supplement [SE](#).

2 Reference Publications

2.1 Normative references

2.1.1 For undated references to standards, such reference shall be considered to refer to the latest edition and all revisions to that edition up to the time when this standard was approved. For dated references to standards, such reference shall be considered to refer to the dated edition and all revisions published to that edition up to the time the standard was approved.

ANCE (Mexican National Standards)

NMX-J-024-ANCE

Iluminación – Portalámparas roscados tipo Edison – Especificaciones y métodos de prueba

NMX-J-325-ANCE

Iluminación – Portalámparas para lámparas fluorescentes – Especificaciones y métodos de prueba

NMX-J-565/2-11-ANCE

Prueba de riesgo de incendio – Parte 2-10: Métodos de prueba basados en hilo incandescente/caliente – Método de prueba de inflamabilidad de hilo incandescente para productos finales

NOM-001-SEDE

Instalaciones Eléctricas (utilización)

NOM-058-SCFI

Productos eléctricos – Balastros para lámparas de descarga eléctrica en gas – Especificaciones de seguridad

NMX-J-578-ANCE

Iluminación – Lámparas fluorescentes compactas autobalastradas – Seguridad y métodos de prueba

CSA Group

C22.1-18

Canadian Electrical Code, Part I, Safety Standard for Electrical Installations

CAN/CSA-C22.2 No. 0-10 (R2015)

General Requirements – Canadian Electrical Code, Part II

C22.2 No. 0.1:19

General Requirements for Double-Insulated Equipment

C22.2 No. 0.15-15

Adhesive labels

CAN/CSA-C22.2 No. 0.17-00 (R2018)

Evaluation of Properties of Polymeric Materials

C22.2 No. 43-17

Lampholders

C22.2 No. 66.1-06 (R2015)

Low Voltage Transformers – Part 1: General Requirements

CAN/CSA-C22.2 No. 74-16

Equipment for use with electric discharge lamps

C22.2 No. 250.0-08 (R2018)

Luminaires

C22.2 No. 250.13-17

Light Emitting Diode (LED) Equipment for Lighting Applications

C22.2 No. 256-14 (R2019)

Direct Plug-In Nightlights

CAN/CSA-C22.2 No. 60065:16

Audio, Video and Similar Electronic Apparatus – Safety Requirements

CAN/CSA-C22.2 No. 60950-1-07 (R2016)

Information Technology Equipment – Safety – Part 1: General Requirements

CAN/CSA-E60384-14:14 (R2019)

Fixed capacitors for use in electronic equipment – Part 14: Sectional specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains

UL (Underwriters Laboratories Inc.)

UL 94

Tests for Flammability of Plastic Materials for Parts in Devices and Appliances

UL 101

Leakage Current for Appliances

UL 496

Lampholders

UL 746C

Polymeric Materials – Use in Electrical Equipment Evaluations

UL 796

Printed-Wiring Boards

UL 796F

Flexible Materials Interconnect Constructions

UL 840

Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment

UL 935

Fluorescent-Lamp Ballasts

UL 969

Marking and Labeling Systems

UL 1029

High-Intensity-Discharge Lamp Ballasts

UL 1310

Standard for Class 2 Power Units

UL 1412

Fusing Resistors and Temperature-Limited Resistors for Radio- and Television-Type Appliances

UL 1446

Systems of Insulating Materials – General

UL 1577

Optical Isolators

UL 1598

Luminaires

UL 1694

Standard for Tests for Flammability of Small Polymeric Component Materials

UL 2097

Reference Standard for Double Insulation Systems for Use in Electronic Equipment

UL 60384-14

Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains

UL 8750

Standard for Light Emitting Diode (LED) Equipment for Use In Lighting Products

UL 60730-1

Standard for Safety Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements

UL 60730-2-6

Standard for Safety Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Pressure Sensing Controls Including Mechanical Requirements

UL 60950-1

Information Technology Equipment – Safety – Part 1: General Requirements

ANSI (American National Standards Institute)

ANSI C78.24

Electric Lamps: Two-inch (51-mm) Integral-Reflector Lamps with Front Covers and GU5.3 of GX5.3 Bases

ANSI C81.61

Specifications for Bases (Caps) for Electric Lamps

ANSI C81.62

Electric Lampholders

ANSI C81.63

Gauges for Electric Lamp Bases and Lampholders

ANSI/ISA (American National Standards Institute/Instrumentation, Systems, and Automation Society)

ANSI/ISA MC96.1

Temperature Measurement Thermocouples

ASTM (American Society for Testing and Materials)

ASTM D36/D36M

Standard Test Methods for Softening Point of Resins Derived from Naval Stores by Ring-and -Ball Apparatus

ASTM D56

Standard Test Method for Flash Point by Tag Closed Cup Tester

ASTM D93

Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester

ASTM D 1000
Standard Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications

ASTM D1525
Standard Test Methods for Vicat Softening Temperature of Plastics

ASTM E 28
Standard Test Methods for Softening Point of Resins Derived from Naval Stores by Ring-and-Ball Apparatus

IEC (International Electrical Commission)

IEC 60081
Double-Capped Fluorescent Lamps – Performance Specifications

IEEE (Institute of Electrical and Electronics Engineers)

IEEE C62.41
IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits

NEMA (National Electrical Manufacturers Association)

NEMA C82.3
Electric Lamps – Reference Ballasts for Fluorescent Lamps

NEMA C78.375A
Electric Lamps – Fluorescent Lamps – Guide for Electrical Measures

NEMA C78.40
Electric Lamps - Specifications for Mercury Lamps

NEMA C78.42
Electric Lamps — High-Pressure Sodium Lamps

NEMA C78.43
Electric lamps: Single-Ended Metal Halide Lamps

NEMA C78.81
Electric Lamps – Double-Capped Fluorescent Lamps – Dimensional and Electrical Characteristics

NEMA C78.389
Electric Lamps – High Intensity Discharge Methods of Measuring Characteristics

NEMA C78.901
Electric Lamps – Single Base Fluorescent Lamps – Dimensional and Electrical Characteristics

NEMA C82.5
Lamp Ballasts – High-Intensity Discharge and Low-Pressure Sodium Lamps

NFPA (National Fire Protection Association) – NOT AUTHORIZED FOR FURTHER

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NFPA 70
National Electrical Code (NEC)

NFPA 704
Standard System for the Identification of the Hazards of Materials for Emergency Response

2.2 Informative references

2.2.1 See Annex [A](#) for a list of component standards.

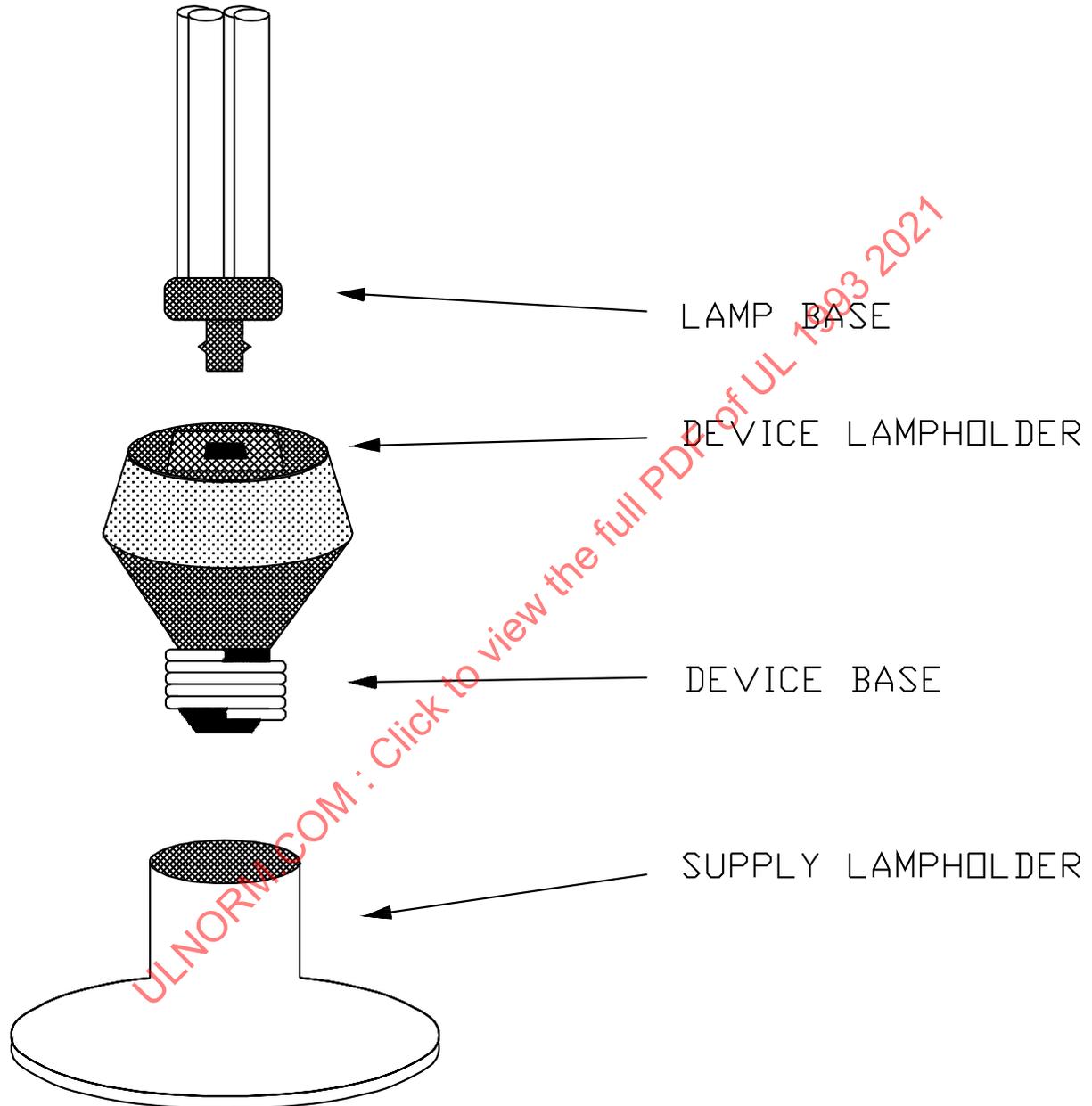
3 Definitions

3.1 The following terms and definitions apply in this standard. See [Figure 3.1](#) for illustrations of the definitions in Clauses [3.4](#), [3.5](#), and [3.21](#).

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Figure 3.1
Example of terminology for lamp adapters

(See Clause 3.1)



SM685

3.2 ACCESSIBLE NON-CURRENT-CARRYING CONDUCTIVE (METAL) PART – a conductive part without basic insulation that, under normal operating conditions, carries no electrical current. A grounded dead conductive part may carry leakage current.

3.3 DEVICE – a self-ballasted lamp or lamp adapter. The specific name is used when it applies to only one of the devices.

3.4 DEVICE BASE – a screw-base or other ANSI base that connects the device to a mating lampholder for outlet boxes or to lampholders provided in luminaires, portable luminaires, or signs.

3.5 DEVICE LAMPHOLDER – a lampholder provided for the replaceable light source.

3.6 DEVICE LAMPHOLDER KEYING – a lampholder design that can accommodate only matching lamp bases.

3.7 DIMMER, STANDARD – a dimmer or control that modifies the amplitude or waveshape of the lamp's power source in order to reduce light output or energy consumption. This includes the 2-wire triac-based dimmers typically used to dim incandescent lamps.

3.8 DOUBLE INSULATION – an insulation system comprised of both basic insulation and supplementary insulation.

3.9 ELECTRONIC BALLAST – a ballast, generally involving high-frequency switching that is controlled by active components (transistors, thyristors, and the like), and with the lamp ballasting impedance provided by a series capacitive or inductive reactance appropriate for the high switching frequency. "Ballast" also refers to other drivers or supplies that operate lamp technologies other than fluorescent.

3.10 ENCLOSURE – a material provided to enclose parts and components that can involve the risk of fire or electric shock hazard.

3.11 LAMP ADAPTER –

In Canada and the United States, a self-ballasted lamp with a replaceable light source.

In Mexico, a device with an Edison screwbase provided with its controller and lampholder for the replaceable light source.

3.12 LAMP CONNECTOR – a set of contacts attached to flexible conductors that provides a removable means for electrical connection to a lamp but does not provide mechanical support.

3.13 LAMP, SELF-BALLASTED – a device provided with a lamp base and incorporating a non-replaceable light source and any additional elements necessary for starting and stabilizing operation of the light source, which cannot be dismantled without being permanently damaged.

3.14 LIVE PART – a metal or other conductive part that, during intended use, has an electrical potential difference with respect to earth ground or any other conductive part. The grounded (or neutral) supply conductor is considered to be a live part.

3.15 LIVE PART, HAZARDOUS – a conductive part without basic insulation, where a risk of electric shock exists.

3.16 LOCATION, DAMP – an exterior or interior location that is normally or periodically subject to condensation of moisture in, on, or adjacent to electrical equipment, including partially protected locations. The interior of a luminaire or sign intended for wet locations is considered a damp location.

Note 1: Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold storage warehouses.

Note 2: Devices intended for damp locations may also be used in dry locations.

3.17 LOCATION, DRY – a location not normally subject to dampness, but could include a location subject to temporary dampness.

Note: For example, a building under construction.

3.18 LOCATION, WET – a location in which water or other liquid can drip, splash, or flow on or against a device.

Note 1: For example, vehicle washing areas, showers, or unprotected locations exposed to weather.

Note 2: Devices intended for wet locations may also be used in dry and damp locations.

3.19 LUMINAIRE, RECESSED – a luminaire that is designed to be either wholly or partially recessed in a mounting surface.

3.20 POWER CAPACITOR – a capacitor used with a magnetic ballast that is connected:

- a) In series with a lamp or lamps and provides the ballast impedance for the lamp current, or
- b) For power-factor correction across the input leads of the ballast or across an extension of the primary winding.

3.21 SUPPLY LAMPHOLDER – a lampholder of a luminaire or portable luminaire or sign that can accommodate and supply power to a self-ballasted lamp or lamp adapter.

3.22 TYPE TEST – testing of a representative sample of the device with the objective of determining if the device, as designed and manufactured, can meet the requirements of this standard.

4 General Requirements

4.1 Components

4.1.1 Except as indicated in Clause [4.1.2](#), a component of a product covered by this standard shall comply with the requirements for that component. See Annex [A](#) for a list of standards covering components generally used in the products covered by this standard. A component shall comply with the ANCE, CSA, or UL standards as appropriate for the country where the product is to be used.

In Mexico, the requirements of Clause [4.1](#) do not apply.

4.1.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

4.1.3 A component shall be used in accordance with its rating established for the intended conditions of use.

4.1.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

4.2 Application of requirements

4.2.1 The requirements of the national installation codes and other practices of Canada, Mexico, and the United States have been addressed in the requirements of this standard.

4.2.2 A product intended to be used in Canada, Mexico, and the United States shall comply with the requirements of this standard for those countries.

4.2.3 A product to be used only in Canada, Mexico, or the United States shall comply with the common requirements of this standard and the applicable country-specific requirements, where so noted.

4.2.4 In Canada, general requirements applicable to these products are provided in CAN/CSA-C22.2 No. 0.

4.3 Units of measurement

4.3.1 The values given in SI (metric) units shall be normative. Any other values are for information only.

4.3.2 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4.3.3 All values of voltage and current are root mean square (rms) values unless otherwise noted.

4.3.4 Temperatures are given in Celsius only.

4.4 Assembly and packaging

4.4.1 A device shall be completely assembled and wired with each electrical component mounted in place and with each splice and connection completed when shipped from the factory. The lamp may be packaged separately in the case of a lamp adapter.

4.5 Principles

4.5.1 Risk of electric shock

4.5.1.1 Risk of electric shock can occur due to a number of factors, including:

- a) Voltage between conductive parts,
- b) Current available,
- c) Whether the current is pulsed or continuous,
- d) Frequency of voltage and current,
- e) Pathway through the human body, and

f) Skin resistance.

4.5.1.2 Risk of electric shock is usually defined only in terms of electrical voltage, current, and frequency. Throughout this standard, voltage between parts greater than $30 V_{\text{rms}}$, $42.4 V_{\text{peak}}$ (and DC) – half of these limits for wet locations – is considered to be a risk of electric shock. When the current available is greater than $0.5 \text{ mA}_{\text{rms}}$ for perception and greater than $5.0 \text{ mA}_{\text{rms}}$ for let-go, for direct current and alternating current up to 1 kHz, the current is considered to be a risk of electric shock. A passive network connected across the meter input terminals of a measuring instrument compensates for the pathway body impedance and frequency. The test method and meter network are described in UL 101 or CSA C22.2 No. 0.

4.5.2 Risk of fire

4.5.2.1 The risk of fire can occur when electrical energy is converted to heat, and the heat is entrapped. It is difficult to define the energy level in terms of electrical parameters alone because the degree of entrapped heat will determine whether or not there would be combustion. In addition, risk of fire can be abated by a suitable enclosure (fire can be confined by the enclosure).

4.5.2.2 There are several possible indicators that are used while conducting a given test. Throughout this standard, the check for fire hazard is either by a specific temperature limit or a change of an indicator. For example, one fire indicator is a layer of cheesecloth, and its change of state occurs when it ignites and causes combustion.

4.5.2.3 Throughout this standard, an energy level of 15 VA is considered to be a sufficient level to support a fire. A circuit having less than 15 VA of available power, as determined by the test method described in Clause [8.19](#) is considered not to be a fire-hazardous circuit.

4.5.2.4 Throughout this standard, a suitable enclosure is described in Clauses [5.1](#) and [5.3](#).

5 Mechanical Construction

5.1 Enclosures

5.1.1 Enclosures shall have the strength and rigidity to resist the abuses to which they are subjected, without increasing the risk of fire, electric shock, or injury to persons due to a reduction of the required spacing for live parts or the loosening or displacement of live parts.

5.1.2 An enclosure shall be of metal or of a polymeric material that complies with Clause [5.3](#).

5.1.3 A metal enclosure shall comply with the minimum thickness specified in [Table 5.1](#). Alternatively, the suitability of the metal forming an Edison, G5 or G13 lamp base is determined by the applicable requirements and mechanical tests in UL 496 or CSA C22.2 No. 43 and Clause [6.1.7](#).

Table 5.1
Thickness of metal enclosures

(See Clause [5.1.3](#))

Metal	Minimum thickness, mm (in)	
Cast metal	1.2	(0.047)
Uncoated sheet steel	0.66 ^a	(0.026)
Nonferrous sheet metal	0.81	(0.032)

^a Uncoated sheet steel with a minimum of 0.51 mm (0.020 in) is acceptable if the ballast part of the device is filled with potting compound.

5.1.4 An enclosure constructed of iron or steel shall be protected against corrosion by plating, painting, or the equivalent on both inside and outside surfaces.

5.2 Openings

5.2.1 An enclosure shall not have openings wider than 2 mm (0.078 in), unless they do not permit a 2 mm (0.078 in) diameter rod of any length to contact live parts. The uninsulated live parts of a lampholder into which a lamp connects are not required to comply.

5.2.2 The enclosure openings in a lamp adapter shall be evaluated with the lamp removed.

5.2.3 A hole in an enclosure through which wires emerge to connect with a lamp connector shall be:

- a) Close-fitting to the emerging lead wires,
- b) Free of burrs, sharp edges, and the like, that can abrade the insulation, and
- c) Provided with a strain-relief means that complies with the strain relief test for lamp connectors of Clause [8.11](#).

5.3 Polymeric materials

5.3.1 In Canada, a polymeric material shall comply with the requirements in CAN/CSA-C22.2 No. 0.17 and with the requirements of Clauses [5.3.2](#) to [5.3.4](#) and Clause [5.3.6](#) when the material is used to:

- a) Enclose electrical parts,
- b) Provide direct or indirect support of live parts, or
- c) Both.

In Mexico, the parts of insulating material that contain live parts and external parts of insulating material that provide protection against electrical shock shall be subjected to the glow-wire test in accordance with NMX-J-565/2-11-ANCE and to the following:

- a) The test specimen shall be an end product. If it is necessary to take a part from the lamp in order to perform the test, care shall be taken to assure that the test conditions are not significantly different from that which occurs in normal use conditions;
- b) The temperature in the tip of the glow-wire shall be 650 °C.

In the United States, a polymeric material shall comply with the requirements for portable equipment specified in UL 746C and with the requirements of Clauses [5.3.2](#) to [5.3.6](#) when the material is used to:

- a) Enclose electrical parts,
- b) Provide direct or indirect support of live parts, or
- c) Both.

5.3.2 A polymeric material used to enclose electrical parts shall have a Relative Thermal Index (RTI), including electrical and mechanical, with impact properties of at least the temperature measured during the temperature test of Clause [8.5](#), unless the measured temperature is less than 65 °C.

5.3.3 A polymeric material used as an enclosure shall have a flammability rating of 5-VA, 5-VB, or V-0 in accordance with UL 94 or CAN/CSA-C22.2 No. 0.17. Polymeric materials used solely to enclose electrical parts that are not part of a fire-hazardous circuit may have a minimum flammability rating of 94-HB.

5.3.4 A polymeric material used as an enclosure of a device marked for wet location use shall comply with the ultraviolet light exposure test specified in UL 746C or CAN/CSA-C22.2 No. 0.17.

5.3.5 With respect to UL 746C, the following tests are not required to be conducted:

- a) The abnormal operation and severe conditions test,
- b) The input after mold-stress relief distortion test, and
- c) The volume resistivity test.

5.3.6 A device shall comply with the mold-stress relief distortion test of Clause 8.9.

5.3.7 A polymeric material used for direct support as electrical insulation shall be able to withstand the hot wire ignition (HWI), the comparative tracking index test (CTI), and the high current arc ignition (HAI) to a level of at least the values in accordance with Table 5.2.

Table 5.2
Ratings of polymeric materials^a

(See Clause 5.3.7)

Test	Environmental Rating	Minimum Potential	PLC ^d
CTI ^c	Dry location	≥100 volts	4 or less
	Damp location	≥175 volts	3 or less
	Wet location	≥250 volts	2 or less
Test	Flammability Classification ^b	Minimum Time	PLC ^d
HWI ^c	V-0, VTM-0	≥7 seconds	4 or less
	5-VA or 5-VB only	≥15 seconds	3 or less
Test	Flammability Classification ^b	Minimum Time	PLC ^d
HAI ^c	V-0, VTM-0	≥15 seconds	3 or less
	5-VA or 5-VB only	≥30 seconds	2 or less

^a Enclosures of phenolic, urea, or other thermoset materials are acceptable as legacy materials. Thermoplastic materials shall comply with this table.

^b Flammability classification determined by prior classification or the end product shall be evaluated to the vertical burning tests in accordance with UL 94 or CAN/CSA-C22.2 No. 0.17. Subsequently, the HWI and HAI requirements are determined as a function of the flammability classification.

^c Determined by prior classification or by the end-product tested in accordance with UL 746C or CAN/CSA-C22.2 No. 0.17.

^d For materials with other than VTM flammability classifications, the performance level class (PLC) for material shall be evaluated using the specimen thickness employed in the end product. PLCs have been established in order to give a consistent numbering for improved performance (PLC=0 is best; PLC=5 is poorest) and avoid an excessive level of implied precision. Material performances for several tests and recorded as PLC values are based on the mean test results rather than recording the exact numerical results.

5.4 Weight and moment

5.4.1 A device shall have weight and moment limitations as specified in Table 5.3.

Table 5.3
Weight and moment limitations

(See Clause [5.4.1](#))

Device base	Maximum weight, ^{a,c} kg (lbs)	Maximum moment, ^{a,b} N·m (in-lbs)
E12 (Candelabra)	0.50 (1.15)	0.60 (5.54)
E17 (Intermediate)	0.75 (1.63)	0.90 (7.85)
E26 (Medium), GU10, GU24	1.15 (2.5)	1.35 ^c (12)
E39 (Mogul)	1.70 (3.75)	2.05 (18)

^a For weight and moment measurements, lamp adapters shall be provided with lamps.

^b The moment is the weight of a device multiplied by the distance between the center contact of the device lamp base and the center of gravity of the device.

^c Includes the weight of any glassware and/or shade provided with the device. See Clause [5.4.3](#).

5.4.2 A device that is constructed so that the alignment with the existing incandescent luminaire or portable luminaire requires an adjustment greater than ± 20 degrees shall be provided with adjustment of the device base with relation to the remainder of the device. Examples include:

- a) A rectangular-shaped device in which the device is to be parallel with existing walls when installed in a ceiling surface luminaire, and
- b) A device incorporating a ballast compartment or lamp support arms that will in some cases have to be rotated more than 20 degrees to properly clear harps in portable luminaires.

5.4.3 A device intended to be used with a shade, glassware, or diffuser shall be provided with that accessory.

5.4.4 A lamp adapter shall be provided with a positive means to retain the lamp or lamps in place in any possible mounting orientation, such as by clips, retaining springs, or the equivalent. A securing means relying solely on the electrical contacts of the lampholder does not meet this requirement.

5.4.5 When the integrity of the lamp securing means of a lamp adapter cannot be determined, the device lampholder shall comply with the minimum retention force values specified in ANSI C81.62, using the appropriate plug gauge specified in ANSI C81.63 for the intended lamp type.

5.5 Movable joints

5.5.1 Electrical conductors located in circuits considered a risk of fire or electric shock that are subject to movement shall be of the stranded type. The conductors shall be of sufficient length and suitably protected so that any movement does not stress electrical connections or cause conductors to bear against any sharp edges.

5.5.2 Any joint that allows movement while the lamp is installed in its lampholder(s) shall be constructed so that repeated adjustments do not have a detrimental effect on lamp components. Compliance shall be determined by the joint endurance test in Clause [8.22](#).

5.5.3 Any rotational stops shall be sufficiently robust to withstand lamp insertion and repeated adjustments without damage. Compliance shall be determined by the joint torsion test in Clause [8.23](#).

5.5.4 Clauses [5.5.2](#) and [5.5.3](#) do not apply if: