

UL 1029

High-Intensity-Discharge Lamp Ballasts



Underwriters Laboratories Inc. (UL)
333 Pfingsten Road
Northbrook, IL 60062-2096

UL Standard for Safety for High-Intensity-Discharge Lamp Ballasts, UL 1029

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Revisions: This Standard contains revisions through and including December 11, 2007.

Summary of Topics

The revisions dated December 11, 2007 were issued to incorporate the following:

- ***Revision to the equation in paragraph 21.1.4 to determine the temperature of a winding when testing for a higher ambient temperature rating.***
- ***Editorial corrections in Table 7.1 and paragraph 9.4.***
- ***Revision to the component standards list in Appendix A.***

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Text that has been changed in any manner is marked with a vertical line in the margin. Changes in requirements are marked with a vertical line in the margin and are followed by an effective date note indicating the date of publication or the date on which the changed requirement becomes effective.

The new and revised requirements are substantially in accordance with UL's Proposal(s) on this subject dated October 12, 2007.

The revisions dated December 11, 2007 include a reprinted title page (page1) for this Standard.

As indicated on the title page (page 1), this UL Standard for Safety is an American National Standard. Attention is directed to the note on the title page of this Standard outlining the procedures to be followed to retain the approved text of this ANSI/UL Standard.

As indicated on the title page (page1), this UL Standard for Safety has been adopted by the Department of Defense.

The UL Foreword is no longer located within the UL Standard. For information concerning the use and application of the requirements contained in this Standard, the current version of the UL Foreword is located on ULStandardsInfoNet at: <http://ulstandardsinfo.net/ulforeword.html>

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New product submittals made prior to a specified future effective date will be judged under all of the requirements in this Standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued Listing, Recognition, and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

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1-2B	December 11, 2007
3	August 3, 1998
4	February 28, 2006
5-7	February 7, 2001
8	December 11, 2007
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9	August 3, 1998
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10A	February 7, 2001
10B	August 3, 1998
11	May 25, 1994
12-14B	December 11, 1997
15-17	February 7, 2001
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The most recent designation of ANSI/UL 1029 as an American National Standard (ANSI) occurred on December 11, 2007. The ANSI approval for this standard does not include the Cover Page, Transmittal Pages, or Title Page.

This ANSI/UL Standard for Safety, which consists of the Fifth Edition with revisions through December 11, 2007, is under continuous maintenance, whereby each revision is ANSI approved upon publication.

The Department of Defense (DoD) has adopted UL 1029 on April 30, 1994. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc. and is not part of the ANSI approved standard.

Revisions of this Standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements. Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <http://csds.ul.com>.

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INTRODUCTION

1 Scope

1.1 The requirements in this standard cover indoor and outdoor ballasts, including starting circuits for the operation of high-intensity-discharge lamps, and associated equipment, in accordance with the National Electrical Code, from an alternating-current power supply with nominal input ratings of 600 V rms or less. High-intensity-discharge lamps include mercury, metal halide, high-pressure sodium, and similar types. For convenience, although technically not HID lamps, low-pressure sodium lamps are included with the group.

1.2 The requirements for ballasts consisting of resistance only are excluded from this standard.

1.3 An open core and coil ballast is acceptable only for use when in a lighting fixture, sign, or other enclosure acceptable for its intended application.

1.4 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard does not comply with this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

1.4 revised February 7, 2001

2 Glossary

2.1 For the purpose of this standard the following definitions apply.

2.2 BALLAST, NONRECESSED – A ballast intended to be mounted in a remote location, such as an equipment closet, that would not come in contact with building thermal insulation.

2.3 BALLAST, REACTANCE – A ballast, the impedance of which is provided by:

- a) Inductive reactance,
- b) Capacitive reactance, or
- c) Both inductive and capacitive reactance.

2.4 BALLAST, REACTOR (SIMPLE REACTANCE) – A reactance type ballast in which the impedance (inductive reactance) is provided by a single coil and core– not a transformer.

2.5 BALLAST, RECESSED – A thermally protected ballast intended to be mounted in a recessed space and may be remote from a fixture. All insulation is intended to be spaced at least 3 inches (76.2 mm) from the sides of the ballast, however if insulation does come in contact with the ballast it is provided with thermal protection that will prevent it from overheating.

2.6 BALLAST, REMOTE – A ballast that is not intended to be mounted on a fixture or that is intended to be mounted on the fixture 18 inches (457 mm) or more from the housing as measured from the nearest point on the ballast to the nearest point (other than an incidental projection) on the housing. The ballast may be either recessed or nonrecessed.

2.7 GENERAL-USE – A ballast type that has been determined acceptable for direct installation in field applications in accordance with the National Electric Code. A ballast that complies with the requirements of this standard would be considered a General-Use ballast.

2.8 POWER CAPACITOR – A capacitor that is connected:

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

3 Components

3.1 Except as indicated in 3.2, a component of a product covered by this standard shall comply with the requirements for that component. See Appendix A for a list of standards covering components used in the products covered by this standard.

3.1 revised February 7, 2001

3.2 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.

3.2 revised February 7, 2001

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

3.3 revised February 7, 2001

3.4 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.

3.4 revised February 7, 2001

4 Units of Measurement

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

4.1 revised February 7, 2001

5 Undated References

5.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

CONSTRUCTION

6 General

6.1 A ballast shall be so constructed and assembled that it has the strength and rigidity necessary to resist the abuses to which it is likely to be subjected, without increasing its risk of fire, electric shock, or injury to persons due to total or partial collapse with resulting reduction of spacings, loosening or displacement of parts, or other serious defects.

6.2 An HID lamp ballast is categorized according to the use for which it is intended. A ballast in one category is acceptable, with respect to protection against corrosion, for use as a ballast in any category that precedes it in the following list:

- a) An indoor ballast is acceptable only for use indoors.
- b) A Type 1 outdoor ballast is acceptable for use in
 - 1) Outdoor equipment,
 - 2) A fixture intended for use in wet or damp locations, or
 - 3) An outdoor sign if the ballast is within an overall electrical enclosure.
- c) A Type 2 outdoor ballast is acceptable for use in
 - 1) Outdoor equipment,
 - 2) A fixture intended for use in wet or damp locations, or
 - 3) An outdoor sign if the ballast, in addition to its own enclosure, is within an overall enclosure.
- d) A weatherproof ballast is acceptable for exposure to the weather without an additional enclosure.

7 Enclosures

7.1 General

7.1.1 A ballast shall be provided with an enclosure of metal or a moisture-resistant polymeric material that has been investigated and found acceptable for the intended use. See Polymeric materials, Section 17, for requirements for a polymeric material used as an enclosure. Except as indicated in 7.1.2 and 7.1.3, the enclosure shall house all uninsulated live parts.

7.1.2 Terminals of a ballast intended for mounting on an outlet box need not be additionally enclosed if they are enclosed within the box when the ballast is mounted.

7.1.3 A ballast that is provided with interchangeable sections to adapt the ballast for different mounting means in the field is to have an enclosure that is complete except for that section. The ballast and the interchangeable sections are marked in accordance with 30.2.3.

7.1.4 The metal enclosure of a ballast shall have a thickness not less than as specified in Table 7.1.

7.1.5 The continuity of the grounding system shall not rely on the dimensional integrity of non-metallic material.

7.1.6 The cover of an enclosure shall be secured in place.

7.1.7 A cover that must be removed for the connection of circuit conductors shall not be provided with means for the connection of a wiring system.

Table 7.1
Enclosure thicknesses

Table 7.1 revised December 11, 2007

Type enclosure	Material	Minimum thickness	
		Inches	mm
Sheet metal – other than Weatherproof	galvanized steel	0.029	0.74
	Uncoated steel	0.026 ^c	0.66 ^c
	nonferrous	0.036 ^c	0.91 ^c
Sheet metal – Weatherproof	galvanized steel	0.056	1.42
	uncoated steel	0.053	1.35
	Nonferrous	0.036	0.91
Cast metal	non-reinforced flat surface	1/8, 3/32 ^a	3.2, 2.4 ^a
	Malleable iron and permanent-mold cast aluminum	3/32, 1/16 ^a	2.4, 1.6 ^a
	Die-cast metal	5/64, 3/64 ^a	2.0, 1.2 ^a
Points of Wiring-system Connections	galvanized steel	0.034 ^b	0.86 ^b
	uncoated steel	0.032 ^b	0.81 ^b
	nonferrous	0.045	1.14

^a Thickness meets the intent of the requirement when the shape or size of the surface is such that enough mechanical strength is provided.

^b For a sheet-metal weatherproof enclosure not less than 0.056 inch (1.42 mm) for galvanized steel and 0.053 inch (1.35 mm) for uncoated steel.

Table 7.1 Continued

Type enclosure	Material	Minimum thickness	
		Inches	mm
^c Uncoated sheet steel or nonferrous sheet metal with a minimum thickness of 0.020 inch (0.51 mm) meets the intent of the requirement when:			
1) The ballast is intended to be used indoors only or marked for Type 1 outdoor use;			
2) The overall weight is less than 8.8 pounds (4.0 kg); and			
3) The ballast is completely compound filled, or the ballast complies with the Crushing Resistance and Resistance to Impact tests described in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.			
Note: These are minimum dimensions based on nominal metal gauge thicknesses, for example, 22 Manufacturer's Sheet Gauge, is 0.033 inch, nominal, 0.026 inch minimum. Because of the tolerance in metal gauge sizes it may be necessary to increase the metal thickness so the it is never less than the specified minimum.			

7.2 Weatherproof enclosure

7.2.1 The enclosure of a weatherproof ballast shall be constructed to exclude a beating rain. Unless the enclosure is so constructed that it obviously excludes a beating rain, a weatherproof ballast is to be tested in accordance with Water Spray Test, Section 26.

7.2.2 A hole for rigid metal conduit in the enclosure of a weatherproof ballast shall be threaded, unless it is located wholly below the lowest live part of a ballast. Insulated wire leads are not to be considered live parts.

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7.2.3 A threaded hole for rigid metal conduit in the enclosure of a weatherproof ballast shall be reinforced to provide metal not less than 1/4 inch (6.4 mm) in thickness, and the threads shall be tapered unless a conduit end stop is provided. See 11.1.4.

7.2.4 A bushed hole in a weatherproof ballast intended for open wiring shall not be located in the top or back of the enclosure unless a special hood fitting is provided. If a bushed hole is located in a side above live parts, it shall provide for a downward direction of the wire leaving the enclosure.

7.2.5 There shall be provision for drainage of the enclosure of a weatherproof ballast if knockouts or unthreaded conduit openings are provided. Drainage holes shall not be less than 1/8 inch (3.2 mm) or more than 1/4 inch (6.4 mm) in diameter.

7.2.6 The enclosure of a weatherproof ballast shall be provided with external means for mounting, except that internal means for mounting may be used if constructed to prevent water from entering the enclosure. See 7.2.1.

8 Ventilating Openings

8.1 Openings in an enclosure intended to provide ventilation – including holes, louvers, and openings protected by means of wire screening, expanded metal, or perforated covers – shall be of such size or shape that no opening permits passage of a rod having a diameter of more than 1/2 inch (12.7 mm). If the distance between uninsulated live parts and the enclosure is more than 4 inches (102 mm), openings may be larger than those mentioned, provided that no opening permits passage of a rod having a diameter of more than 3/4 inch (19.0 mm).

8.2 The wires of a screen shall not be smaller than No. 16 AWG, not less than 0.045 inch (1.14 mm), if the screen openings are 1/2 square inch (322 mm²) or less in area, and shall not be smaller than No. 12 AWG, not less than 0.075 inch (1.90 mm), for larger screen openings. Sheet metal used for expanded-metal mesh and perforated sheet metal shall have a thickness of not less than 0.042 inch (1.07 mm) if the mesh openings or perforations are 1/2 square inch (322 mm²) or less in area, and shall have a thickness of not less than 0.093 inch (2.36 mm) for larger openings.

8.3 An opening into a wiring compartment shall be located or shielded that emission of molten metal, burning insulation or the like from the wiring compartment is unlikely under fault conditions.

9 Means for Mounting

9.1 A ballast shall be provided with means for mounting. The construction shall be such that, when the enclosure is mounted on a plane surface, it makes contact with such surface only at points of support. When so mounted, there shall be a spacing through air of not less than 1/4 inch (6.4 mm) between the supporting surface and the enclosure.

Exception: The 1/4 inch spacing need not be maintained if the ballast;

- a) Is intended to be mounted on an outlet-box cover and it is rated at not more than 100 W,*
- b) Is intended for use as an integral part of a fixture, sign, or other equipment, or*
- c) Carries a marking that it must be mounted on a metal, brick, cement, or similar noncombustible surface. See 30.2.2.*

9.2 A ballast intended to be mounted on a standard outlet box shall include an outlet-box cover that, if of sheet steel, shall have a thickness of not less than 0.067 inch (1.70 mm) and shall be protected against corrosion on all surfaces.

9.3 A ballast intended to be supported only by rigid metal conduit, a fixture stud, or similar devices shall comply with the requirements in Section 25, Pullout, Bending, and Twisting Tests.

9.4 A ballast intended for permanent installation and provided with a single, threaded nipple meets the intent of the requirements when the nipple is a standard trade size long enough for two locknuts for assembly to a fixture enclosure. The ballast enclosure shall be evaluated for a construction with a ballast located outside a fixture enclosure.

9.4 revised December 11, 2007

10 Corrosion Protection

10.1 Type 1 outdoor

10.1.1 An indoor ballast and a Type 1 outdoor ballast enclosure of iron or steel shall be protected against corrosion.

10.1.2 An indoor ballast and a Type 1 outdoor ballast are considered to be protected against corrosion when completely coated with paint.

10.1.3 Both the inside and outside surfaces of an indoor ballast and a Type 1 outdoor ballast shall be protected against corrosion, except that corrosion protection need not be applied to:

- a) The interior of an enclosure that is completely compound-filled.
- b) Flat metal surfaces that are tightly clamped together.
- c) Core surfaces that are not exposed.
- d) Simple cut or sheared edges and punched holes.