

UL 234

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Low Voltage Lighting Fixtures for Use in Recreational Vehicles

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UL Standard for Safety for Low Voltage Lighting Fixtures For Use in Recreational Vehicles, UL 234

Fifth Edition, Dated January 21, 2005

Revisions: This Standard contains revisions through and including February 11, 2005.

Summary of Topics

This revision to ANSI/UL 234 is issued to correct the text that accompanies Figure 28.1.

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 following table lists the future effective dates with the corresponding reference.

Future Effective Date	Reference
July 21, 2006	Paragraphs 25.2 and 36.1

The revisions dated February 11, 2005 were issued to correct text that accompanies Figure 28.1.

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. *The Canadian Requirements Comparison Guide (CRG) is not a part of the ANSI approved standard.*

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.ul.com/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 and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

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This Standard consists of pages dated as shown in the following checklist:

Page	Date
1	February 11, 2005
2-17	January 21, 2005
18	February 11, 2005
19-24	January 21, 2005
25	February 11, 2005
26-34	January 21, 2005
A1-A2	January 21, 2005
CRG1-CRG4	January 21, 2005
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UL 234

Standard for Low Voltage Lighting Fixtures for Use in Recreational Vehicles

Prior to the first edition, the requirements for the products covered by this standard were included in the Standard for Electric Lighting Fixtures, UL 57.

First Edition – November, 1979
Second Edition – April, 1983
Third Edition – January, 1993
Fourth Edition – January, 1994

Fifth Edition

January 21, 2005

The most recent designation of ANSI/UL 234 as an American National Standard (ANSI) occurred on January 5, 2005.

This ANSI/UL Standard for Safety, which consists of the Fifth edition, excluding the CRG, with revisions through February 11, 2005, is under continuous maintenance, whereby each revision is ANSI approved upon publication. Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Written comments are to be sent to UL-RTP Standard Department, 12 Laboratory Dr., P.O. Box 13995, Research Triangle Park, NC, 27709-3995.

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

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.

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PART 1 – ALL LUMINAIRES

INTRODUCTION

1 Scope

1.1 These requirements apply to incandescent and fluorescent low-voltage luminaires, rated 24 volts or less, of the surface mounted or recessed type intended for permanent installation in recreational vehicles in accordance with Article 551 of the National Electrical Code, NFPA 70.

1.2 These requirements do not apply to running or clearance lights intended to be mounted on the exterior of a recreational vehicle.

2 Undated References

2.1 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.

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 generally used in the products covered by this standard.

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.

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

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.

4 Units of Measurement

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

CONSTRUCTION

5 Frame and Enclosure

5.1 A frame and enclosure shall be formed and assembled so that it will have the strength and rigidity necessary to resist the abuses to which it is likely to be subjected, without increasing the likelihood of fire or injury to persons due to total or partial collapse, with resulting reduction of spacings, loosening or displacement of parts, or similar effects.

5.2 Sheet metal of a frame or enclosure shall be formed from stock having a minimum thickness of 0.016 inch (0.41 mm) if of steel and 0.020 inch (0.51 mm) if of aluminum.

Exception: Metal may be thinner if the part is investigated and determined to have equivalent mechanical strength. Among the factors to be considered are size, shape, function, and resistance to distortion both during intended use and service and anticipated abuse.

5.3 An enclosure or frame formed of a nonmetallic material may be used if, upon investigation, the material exhibits properties in accordance with the requirement in 5.1. Among the factors to be considered are:

- a) Mechanical strength – the impact evaluation in Section 37, Impact Test;
- b) Combustibility – minimum flammability rating of HB;
- c) Mold stress – the mold stress evaluation in the Standard for Polymeric Material – Use in Electrical Equipment Evaluations, UL 746C shall be performed by the air oven method and;
- d) Temperature – the material shall possess a mechanical impact Relative Temperature Index (RTI), in accordance with Standard for Polymeric Materials – Long Term Property Evaluations, UL 746B, of at least the temperature measured on the part during the normal temperature test.

Exception No. 1: If the temperature measured during the normal temperature test is less than 65°C (149°F), then the enclosure or frame need not comply with this requirement.

Exception No. 2: An enclosure or frame subjected to the Thermal Conditioning Test, Section 36 need not comply with this requirement.

5.4 An operating part, such as a relay or similar device, shall be located such that it will not be exposed to dust or other material that might adversely affect its intended operation.

6 Means for Mounting

6.1 Means for permanent mounting of the luminaire shall be provided.

Exception No. 1: Luminaires intended to be installed only by manufacturers of recreational vehicles may be secured using plastic punching and riveting tools, provided that complete instructions are furnished. Instructions and installation tools shall be subject to investigation.

Exception No. 2: A mounting means other than holes, screws, or bolts is acceptable if equivalent support is provided, as determined by an investigation.

6.2 A hole, boss, and the like shall be arranged so that:

- a) Support is provided; and
- b) Firm seating of the mounting hardware, such as a screw or bolt, will not result in distortion of the bearing surfaces, cracking, breaking, or other adverse effects.

6.3 A luminaire shall be designed and constructed for mounting directly to the mounting surface and not for suspension by a chain or other means that would allow movement or swinging of the luminaire.

7 Thermal Insulation

7.1 Thermal insulation that is provided as part of a luminaire shall be secured in place as described in 7.2.

7.2 Thermal insulation is considered to be secured in place if it is attached to a luminaire by:

- a) Two staples or bolts that will locate the insulation in the intended position;
- b) An adhesive applied to at least one-third of the surface of the insulation;
- c) A member of a luminaire that need not be removed for installation; or
- d) An equivalent means.

Lead wires projecting through insulation are not acceptable for securing the insulation.

7.3 Thermal insulation that forms part of an enclosure shall comply with the applicable requirements in Frame and Enclosure, Section 5. All thermal insulation shall have a flammability rating of HB or better.

8 Corrosion Resistance

8.1 If corrosive action on an iron or steel part will result in a risk of fire, electric shock, or injury to persons, such part shall be made resistant to corrosion by enameling, varnishing, painting, galvanizing, plating, or a similar means.

9 Shades, Diffusers, Lenses, and Decorative Parts

9.1 A shade, diffuser, lens, or decorative part shall be of glass, metal, phenolic composition, or other material having a flammability rating of HB or better.

Exception: A bushing, wire tie, or other small part need not have a flame rating if it meets the following conditions:

- a) Volume is less than 2 cubic inches (32 cm³);*
- b) No dimension is greater than 3 inches (76.2 mm), and*
- c) Not in a position to propagate flame between 2 combustible materials.*

9.2 A shade, diffuser, lens, or decorative part shall be positioned away from contact with any lamp.

10 Current-Carrying Parts

10.1 A current-carrying part shall have mechanical strength and ampacity in accordance with the intended use.

10.2 Steel used as a current-carrying part shall comply with Frame and Enclosure, Section 5, and its use shall be limited to those parts of a luminaire that primarily serve a mechanical function, such as a lampholder or a mounting frame.

11 Mounting of Components and Parts

11.1 A component such as a lampholder, switch, or other part of a luminaire assembly shall be restricted from loosening or turning if such motion may adversely affect the intended performance of a component or may result in a risk of fire.

11.2 The position of a lamp with respect to the enclosure or any other part of the luminaire shall be maintained during intended use and servicing.

11.3 A part used for the direct support of a current-carrying part shall be positioned such that possible movement will not reduce spacings below those specified in Spacings, Section 19.

11.4 The use of a lock washer, a star washer, dimples, upturned lugs, ears, or the equivalent to restrict movement is acceptable. Friction alone is not acceptable.

11.5 The center contact or contacts of a lampholder shall be securely positioned so that any movement will not reduce spacings below the minimum values specified in Spacings, Section 19. The center contact or contacts shall be secured both when the lamp is in place and when the lamp is removed. A center contact may be secured by positively routing the lead with a knot within 1/4 inch (6.35 mm) of the back of the lampholder. Friction or gravity alone is not considered an acceptable means of securement.

11.6 Rotation of a part of a luminaire assembly intended for rotation shall be limited to not more than 360 degrees if damage to wiring or any other electrical part is likely to result from rotation in excess of 360

12 Supply Connections

12.1 Two wire leads or terminals shall be provided for connection to the supply source.

12.2 Each supply lead shall be stranded, and shall be at least 5 inches (127 mm) but not more than 12 inches (305 mm) in length, as measured from the plane of the mounting surface or the back of a recessed luminaire. Each lead shall be of an ampacity compatible with the load to be served, but not smaller than 18 AWG (0.82 mm²). Nongrounded supply leads shall have insulation that is rated:

- a) A minimum 90°C (194°F); and
- b) For the voltage of the luminaire, but not less than 300 volts in any case.

12.3 The lead to be connected to the grounded supply conductor shall be white, gray or bare, and the remaining lead a color other than green, white, or gray. The white or gray lead shall be connected conductively to the shell of a single-contact lampholder.

Exception: In a construction in which polarity identification of the leads is not significant, such as a luminaire provided with double-contact bayonet-base or bipost lampholders, the supply leads may be any color other than green.

12.4 A terminal provided for field supply connection shall be located so that disassembly of the luminaire (other than removal of a lens, shade, diffuser, or wireway cover) is not necessary in order to make the supply connections.

13 Cord Equipped Luminaire

13.1 A luminaire may be provided with a length of flexible cord terminated with an attachment plug or connector.

13.2 The flexible cord shall comply with Table 13.1.