



UL 2089

Underwriters Laboratories Inc. Standard for Safety

Vehicle Battery Adapters



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UL Standard for Safety for Vehicle Battery Adapters, UL 2089

Third Edition, Dated November 22, 2011

SUMMARY OF TOPICS

This new edition of ANSI/UL 2089 is being issued as an American National Standard and does not include any substantive changes in requirements.

The requirements are substantially in accordance with Proposal(s) on this subject dated June 17, 2011 and September 16, 2011.

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The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

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UL 2089

Standard for Vehicle Battery Adapters

First Edition – June, 1994
Second Edition – December, 2003

Third Edition

November 22, 2011

This ANSI/UL Standard for Safety consists of the Third Edition.

The most recent designation of ANSI/UL 2089 as an American National Standard (ANSI) occurred on November 21, 2011. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or effective date information.

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 These requirements cover portable vehicle battery adapters rated 24 V dc or less that are intended to be supplied from a vehicle cigarette lighter receptacle or power outlet. Vehicle battery adapters may supply outputs for appliances such as portable radios, tape players, battery chargers, and tools.

1.2 Products covered by this standard include:

- a) Cord assemblies consisting of the connector for insertion into a cigarette lighter receptacle, adjacent cord, and connector intended for connection to an appliance; and
- b) Units consisting of the connector for insertion into a cigarette lighter receptacle, adjacent cord, and permanently attached filtering or regulating circuitry which may include an additional enclosure, output cord, and connector or battery receptacle.

1.3 This standard does not cover products intended for marine use in areas where ignition-protected equipment is required.

1.4 Power inverters intended to be supplied from the cigarette lighter receptacle of a vehicle are covered by the requirements in the Standard for Power Converters/Inverters and Power-Converter/Inverter Systems for Land Vehicles and Marine Craft, UL 458.

2 Components

2.1 Except as indicated in 2.2, a component of a product covered by this standard shall comply with the applicable requirements for that component. See Appendix A for a list of standards covering components generally used in the products covered by this standard.

2.2 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.

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

2.4 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 Units of Measurement

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

4 Undated References

4.1 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.

5 Glossary

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

5.2 CIGARETTE LIGHTER CONNECTOR – The male connector provided as part of a vehicle battery adapter for insertion into a cigarette lighter receptacle or a power outlet.

5.3 CIGARETTE LIGHTER RECEPTACLE – The female connector typically provided in a vehicle for the purpose of energizing the vehicle's cigarette lighter. The connector typically has the center contact connected to the positive side of the vehicle battery supply and the outer shell is connected to the negative (chassis) side of the supply. For the purposes of this Standard, the terms cigarette lighter receptacle and power outlet are considered equivalent.

5.4 CLASS 2 OUTPUT – An output complying with the construction, performance, and marking requirements in the Standard for Class 2 Power Units, UL 1310.

5.5 DIRECT CURRENT (DC) – A voltage or current waveform where the instantaneous value does not vary.

5.6 LOW-VOLTAGE LIMITED-ENERGY (LVLE) CIRCUIT – A circuit involving a potential of not more than 42.4 V peak for AC, or 60 V DC, with limited energy as described in Low-Voltage Limited-Energy Circuits, 15.2.

5.7 POWER OUTLET – The female connector typically provided in a vehicle for the purpose of accessory plug devices other than a cigarette lighter. The connector typically has the center contact connected to the positive side of the vehicle battery supply and the outer shell is connected to the negative (chassis) side of the supply. For the purposes of this Standard, the terms cigarette lighter receptacle and power outlet are considered equivalent.

5.8 RISK OF ELECTRIC SHOCK – A risk of electric shock is considered to exist if the voltage between parts exceeds the value specified in 16.2.2.

5.9 RISK OF FIRE – A risk of fire is considered to exist if the conditions as specified in 27.1.2(a) and (b) occur.

5.10 RISK OF INJURY – A risk of injury to persons is considered to exist if one or more of the following conditions exist:

- a) If sharp edges, burrs, or projections are present that may result in injury during use or servicing;
- b) If the stability of a product is such that it may result in injury to persons; or

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- c) If there is likelihood that a part of the body could be endangered or that clothing would be entangled by the moving part, resulting in injury to persons.

The words "injury to persons" are in reference to physical harm to persons other than the physiological effects of electric shock.

5.11 TOOL – A screwdriver, coin, key, or any other object that may be used to operate a screw, latch, or similar fastening means.

CONSTRUCTION

6 Mechanical Assembly

6.1 A unit shall be formed and assembled so that it has the strength and rigidity necessary to resist the abuses to which it is likely to be subjected, without resulting in a 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 defects.

6.2 A unit shall have all parts reliably secured in place.

6.3 An enclosure, an opening, a frame, a guard, a knob, a handle, or the like shall not be sufficiently sharp to constitute a risk of injury to persons in normal maintenance or use.

6.4 A unit shall be constructed so that it is not necessary to open or remove the enclosure when the unit is used as intended.

6.5 Each lampholder, switch, and similar component shall be mounted securely and shall be restrained from turning by more than friction between surfaces. For example, the use of a lock washer is an acceptable means to restrain the turning of a device having a single hole mounting means.

Exception No. 1: A lampholder of a type in which the lamp cannot be replaced (such as a neon pilot or indicator light in which the lamp is sealed in by a nonremovable lens) need not be restrained from turning if rotation does not reduce spacings below the minimum acceptable values or produce stress on an electrical connection.

Exception No. 2: A switch or other similar component need not comply with this requirement if the turning of such a component and servicing of the part introduces no additional risk of fire or electric shock, such as reduced spacings below minimum acceptable values or stress on an electrical connection.

6.6 A replaceable lamp in a unit shall be replaceable without opening the enclosure.

6.7 A nonreplaceable pilot lamp, such as an indicating-type overload- or short-circuit protector, a neon light, or an indicator light, is one in which the lamp is sealed-in, such as by an unremovable lens.

6.8 A switch or an overcurrent-protective device shall be located within the unit enclosure and protected in such a manner as not to be accessible or exposed to tampering nor subject to mechanical damage during normal use or as a result of abuse. This requirement does not apply to the actuating means of a switch.

6.9 The requirements in 6.8 also apply to the actuating means – toggle, handle, or the like – if the dislodging of such part exposes live parts or film-coated magnet wire that can be contacted as specified in Accessibility of Live Parts, Section 16.

6.10 The overall mass of the cigarette lighter connector shall not exceed 250 g (8.8 oz). The product of (the total mass) and (the distance between the center of gravity and the input contact positioned to simulate full insertion into a power outlet) shall not exceed 13500 g-mm (18.7 oz-in). For a unit with an attached cord, the determination shall be made with the cord severed at the enclosure, or at the strain-relief means if the strain-relief means is outside the enclosure. For a unit with a detachable cord, the determination shall be made with the cord severed from the mating connector connected to the cigarette lighter connector.

7 Enclosure

7.1 A unit shall be provided with an enclosure that shall house all current-carrying parts that present a risk of electric shock. The enclosure shall have the strength and properties necessary to reduce the risk of mechanical damage to the various parts.

7.2 A unit shall have no openings larger than those complying with Section 16, Accessibility of Live Parts.

7.3 If an acceptable grade of vulcanized fiber is used as part of the enclosure for the support of parts (terminals and the like) that do not present a risk of fire or electric shock, the amount of fiber shall not be more than is necessary to support the parts in question. The fiber shall not be less than 1/32 in (0.8 mm) thick and shall not introduce a risk of fire, electric shock, or injury to persons as a result of abuse.

7.4 An enclosure constructed of sheet metal shall be formed from stock having a thickness not less than that specified in Table 7.1. The thickness of enclosure sheet metal other than steel or aluminum shall not be less than that specified in Table 7.1 for uncoated steel and shall have the necessary strength and rigidity.

Table 7.1
Minimum acceptable thickness of enclosure metal

Metal	At small, flat, unreinforced surfaces and at surfaces of a shape or size to provide adequate mechanical strength	
	inch	(mm)
Die-cast	3/64	(1.2)
Cast malleable iron	1/16	(1.6)
Other cast metal	3/32	(2.4)
Uncoated sheet steel	0.026	(0.66)
Galvanized sheet steel	0.029	(0.74)
Nonferrous sheet metal other than copper	0.036	(0.91)
Copper	0.033	(0.84)

7.5 In addition to the performance tests specified in this Standard, the material of a polymeric enclosure shall have a minimum flammability classification of V-0, V-1, or V-2 and shall provide the level of performance specified in Table 7.2 for the corresponding electrical properties.

Exception: An enclosure material may be accepted based on the end-product tests specified in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.