

UL 2089

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Vehicle Battery Adapters

Underwriters Laboratories Inc. (UL)
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UL Standard for Safety
for
Vehicle Battery Adapters, UL 2089

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Revisions: This Standard contains revisions through and including July 30, 1998.

A change is indicated by a note following the affected item. The note is preceded and followed by an asterisk.

The revisions dated July 30, 1998 include a reprinted title page (page 1) for this Standard.

The revisions dated July 30, 1998 were issued to make editorial corrections.

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As indicated on the title page (page 1), this UL Standard for Safety has been adopted by the Department of Defense.

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A change in an effective date is indicated by a note following the affected item, and giving both the previous effective date and the new date the requirement becomes effective.

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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1	June 2, 1994 (Reprinted: July 30, 1998)
2, 3	July 30, 1998
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UL 2089

Standard for

Vehicle Battery Adapters

First Edition

June 2, 1994

Approval as an American National Standard (ANSI) covers the numbered paragraphs on pages dated June 2, 1994. These pages should not be discarded when revised or additional pages are issued if it is desired to retain the ANSI approved text.

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

Approved as ANSI/UL 2089-1995, May 10, 1995

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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FOREWORD

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product employing materials or having forms of construction differing from those detailed in the requirements of this Standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be judged to comply with the Standard.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

INTRODUCTION

1 Scope

Section 1 effective December 4, 1995

1.1 These requirements cover portable adapters rated 24 volts dc or less that are intended to be supplied from the battery-powered electrical system of a vehicle and used in accordance with the National Electrical Code, NFPA 70. Connection to a vehicle electrical system in which the vehicle chassis is connected to the negative side of the battery supply, is by means of a connector intended for insertion into the cigarette lighter receptacle. 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.

1.5 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, electric shock, or injury to persons shall be evaluated using the appropriate additional component and end-product requirements to determine that the level of safety as originally anticipated by the intent of this standard is maintained. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard shall not be judged to comply with this standard. Where appropriate, revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

1.5 revised July 30, 1998

2 Components

Section 2 effective December 4, 1995

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 need not comply with a specific requirement that:

- a) Involves a feature or characteristic not needed 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 recognized rating established for the intended conditions of use.

2.4 Specific components are considered as being 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 for which they have been evaluated.

3 General

Section 3 effective December 4, 1995

3.1 Units of measurement

3.1.1 If a value for measurement is followed by a value in other units in parentheses, the second value may be only approximate. The first stated value is the requirement.

3.2 Undated references

3.2.1 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.

4 Glossary

Section 4 effective December 4, 1995

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

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

4.3 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.

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

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

4.6 LOW-VOLTAGE LIMITED-ENERGY (LVLE) CIRCUIT – A circuit involving a potential of not more than 42.4 volts peak for AC, or 60 V DC, with limited energy as described in Low-Voltage Limited-Energy Circuits, 14.2.

4.7 RISK OF ELECTRIC SHOCK – A risk of electric shock is considered to exist if the voltage between parts exceeds the value specified in 15.2.2.

4.8 RISK OF FIRE – A risk of fire is considered to exist if the conditions as specified in 26.1.2(a) and (b) occur.

4.9 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.
- 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.

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

CONSTRUCTION

5 Mechanical Assembly

Section 5 effective December 4, 1995

5.1 A unit 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 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.

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

5.3 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.

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

5.5 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.

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

5.7 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.

5.8 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.

5.9 The requirements in 5.8 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 15.

6 Enclosure

Section 6 effective December 4, 1995

6.1 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.

6.2 A unit shall have no openings larger than those complying with Section 15.

6.3 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 inch (0.8 mm) thick and shall not introduce a risk of fire, electric shock, or injury to persons as a result of abuse.

6.4 An enclosure constructed of sheet metal shall be formed from stock having a thickness not less than that specified in Table 6.1. The thickness of enclosure sheet metal other than steel or aluminum shall not be less than that specified in Table 6.1 for uncoated steel and shall have the necessary strength and rigidity.

Table 6.1
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	
	Inches	Millimeters
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)