



UL 1077

Underwriters Laboratories Inc. Standard for Safety

Supplementary Protectors for Use in Electrical Equipment



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UL Standard for Safety for Supplementary Protectors for Use in Electrical Equipment, UL 1077

Sixth Edition, Dated July 14, 2005

Revisions: This Standard contains revisions through and including February 13, 2009.

Summary of Topics

These revisions to ANSI/UL 1077 are being issued to include the following changes to requirements:

Clarification of the Scope Regarding Devices which Incorporate a Motor Anti-Auto Restart Feature or a Motor Drop Out Circuit

Clarification of the Reference to “Trip Unit” in UL 1077

Clarification of the Testing of Supplementary Protectors in an Oven

Clarification of the Scope Regarding Automatic Reset Devices

Clarification of the Use of Cotton as a Fire Indicator

Deletion of the Canadian Requirements Guide (CRG)

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 August 29, 2008.

The revisions dated February 13, 2009 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.

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

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4	March 19, 2008
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The most recent designation of ANSI/UL 1077 as an American National Standard (ANSI) occurred on February 13, 2009. 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 apply to supplementary protectors intended for use as overcurrent, or over- or under-voltage protection within an appliance or other electrical equipment where branch circuit overcurrent protection is already provided, or is not required. Compliance with the following is acceptable for use as a component of an end product.

1.2 The acceptability of a protector in any particular application depends upon its ability to be used continuously under the conditions that prevail in actual service. Accordingly, for a particular application a protector may be affected by the requirements for the equipment it is used in, and it may be necessary to additionally evaluate features or performance characteristics that are not specified in this Standard.

1.3 This Standard also covers accessory devices that may be installed in or on the protector to perform a secondary function. Examples of accessories are alarm and auxiliary switches.

1.4 Devices which ensure a manual restart due to the complete loss of voltage are covered by the Standard for Solid-State Controls for Appliances, UL 244A.

1.4 added February 13, 2009

1.5 Automatic reset devices designed to open the circuit automatically on a predetermined value of time versus current or voltage within an appliance or other electrical equipment are covered by the Standard for Solid-State Controls for Appliances, UL 244A.

1.5 added February 13, 2009

2 Glossary

2.1 **AUXILIARY SWITCH** – A switch that is mechanically operated by the main contact switching mechanism.

2.2 **FIELD WIRING TERMINALS** – Any terminal to which a supply or other wire can be connected by an installer in the field, unless the wire is provided as part of the appliance or other electrical equipment and a pressure terminal connector, soldering lug, soldered loop, crimped eyelet, or other means for making the connection is factory-assembled to the wire.

2.3 **MAGNETIC TRIP PROTECTOR** – A protector that is caused to trip by current through a magnet coil.

2.4 **OVERCURRENT-TRIP PROTECTOR** – A thermal or magnetic trip protector intended to trip the contact circuit when the current through the thermal element or trip coil, which is in series with contact circuit, exceeds a predetermined value.

2.5 **OVERVOLTAGE-TRIP PROTECTOR** – A magnetic trip protector intended to trip the contact circuit when the voltage across the trip coil rises above a predetermined value.

2.6 **RATED CURRENT** – For an overcurrent-trip protector, the current that the protector is intended to carry continuously without opening of the circuit.

2.7 **SHUNT TRIP PROTECTOR** – A protector with a trip mechanism energized by a separate source of voltage or current that is derived from the main contact circuit or from an independent source. The trip mechanism is either of the overcurrent type or the voltage actuated type.

2.8 SUPPLEMENTARY PROTECTOR – A manually resettable device designed to open the circuit automatically on a predetermined value of time versus current or voltage within an appliance or other electrical equipment. It is permitted to be provided with manual means for opening or closing the circuit.

2.9 THERMAL AND MAGNETIC TRIP PROTECTOR – A combination of 2.3 and 2.4.

2.10 THERMAL TRIP PROTECTOR – A protector that is caused to trip by heat generated from current flowing through a thermal element.

No Text on This Page

2.11 TRIP CURRENT – The current at which an overcurrent-trip protector is intended to open the contact circuit at a given ambient temperature and a given time.

2.12 TRIP-FREE – A protector designed so that the contacts cannot be held in the closed position by the operating means during trip command conditions.

2.12 effective July 14, 2008

2.13 TRIP-FREE, CYCLING – A protector designed so that the contacts cannot be held in the closed position by the operating means during trip command conditions, but will reclose when the closing command is maintained. The protector will continue to close momentarily and repeatedly as long as the close command is maintained by the operating means during trip command conditions.

2.13 effective July 14, 2008

2.14 TRIP MECHANISM – The part of the protector that senses the abnormal condition in the circuit and causes the contact circuit to open.

2.15 TRIP VOLTAGE – The voltage at which an overvoltage protector or undervoltage protector is intended to trip.

2.16 UNDERVOLTAGE-TRIP PROTECTOR – A magnetic trip protector intended to trip the contact circuit when the voltage across the trip coil falls below a predetermined value.

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.

5 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 protector shall have an integral housing for all mechanisms and live parts, except the operating handle and the wiring terminals, and shall be capable of being operated or reset without opening the housing.

6.2 A protector shall be so formed and assembled that it shall have the strength and rigidity necessary to resist the ordinary abuses to which it is capable of being subjected (including the tests specified in this Standard), without increasing its risk of fire, shock or personal injury due to partial or total collapse with a resulting reduction of spacings, loosening or displacement of parts, or other serious defect.

7 Corrosion Protection

7.1 Iron and steel parts except for thermal elements, magnet pole faces, hardened and polished parts such as latching surfaces, and other similar parts, where such protection is impractical, shall be acceptably protected against corrosion by enameling, galvanizing, plating, or other equivalent means.

7.2 The requirements of 7.1 apply to all housings and to all springs and other parts upon which proper mechanical operation depends. It does not apply to small minor parts of iron or steel such as washers, screws, bolts, and other similar parts that are not current-carrying, or to other parts where the malfunction of such unprotected parts would not be likely to result in a risk of fire, electric shock or personal injury. Parts made of stainless steel, properly polished or treated when necessary, do not require additional protection against corrosion.

8 Insulating Materials

8.1 Insulating material for the support of current-carrying parts shall be strong, not easily ignited, and moisture resistant. A material other than porcelain, phenolic, or one that has not been evaluated for the support of current-carrying parts shall be investigated under conditions of actual service to determine if it has the necessary electrical, mechanical, and flammability properties and otherwise meets the intent of the requirements for the particular application. The properties of the material shall be such that it shall withstand the most severe conditions likely to be met in service.

8.2 A material that is used for the direct support of an uninsulated live part shall comply with the Relative Thermal Index (RTI), Hot Wire Ignition (HWI), High-Current-Arc Resistance to Ignition (HAI), and Comparative Tracking Index (CTI) values indicated in Table 8.1. A material is considered to be in direct support of an uninsulated live part when:

- a) It is in direct physical contact with the uninsulated live part; and
- b) It serves to physically support or maintain the relative position of the uninsulated live part.

Exception No. 1: A generic material with a Relative Thermal Index (RTI) as shown in the table for Relative Thermal Indices Based Upon Past Field-Test Performance and Chemical Structure, in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C that is not exceeded during the Temperature Test, Section 20, and is provided in such a thickness that damage does not result from tests required by this Standard, is considered suitable for the direct support of uninsulated live parts.

Exception No. 2: A material without an HWI Performance Level Category (PLC) value or with an HWI PLC value greater (worse) than the value required by Table 8.1 that complies with the end-product Abnormal Overload Test specified in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C, need not comply with the HWI requirements of 8.2.

Exception No. 3: A material without an HAI PLC value or with an HAI PLC value greater (worse) than the value required by Table 8.1 that complies with the Overload Test, Section 21, Endurance, Section 22 and Dielectric strength test, 23A.1, need not comply with the HAI requirements of 8.2.

Exception No. 4: A material that is used in a device not incorporating contacts need not comply with the HAI PLC requirements.

Exception No. 5: A material that is used in a device that incorporates contacts but is not used within 1/2 inch (12.7 mm) of the contacts need not comply with the HAI PLC requirements.

Exception No. 6: A material without a CTI PLC value or with a CTI PLC value greater (worse) than the value required by Table 8.1 need not comply with the requirements of 8.2 when:

- a) The material complies with the end-product Special Arcing Test specified in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C;*
- b) The material has a High-Voltage-Arc Tracking (HVTR) PLC value of 1 or less; or*
- c) The over surface spacings between the uninsulated live parts are at least 1/2 inch (12.7 mm).*

8.2 revised March 19, 2008

Table 8.1
Minimum material characteristics necessary for the direct support of uninsulated live parts

Flame class rating	RTI	Performance level category (PLC)		
		HWI ^b	HAI ^b	CTI ^c
HB	a	2	1	4
V-2	a	2	2	4
V-1	a	3	2	4
V-0	a	4	3	4

^a The Relative Thermal Index (RTI) – Mechanical Without Impact, value of a material is to be determined in accordance with the Standard for Polymeric Materials – Long Term Property Evaluations, UL 746B, by test or by use of the generic RTI table. This material characteristic is dependent upon the minimum thickness at which the material is being used and shall not be exceeded during the Temperature Test, Section 20.

^b The High Current Arc Resistance to Ignition (HAI) and Hot Wire Ignition (HWI) value of a material is to be determined by test in accordance the Standard for Polymeric Materials – Short Term Property Evaluations, UL 746A. This material characteristic is dependent upon the minimum thickness at which the material is being used.

^c The Comparative Tracking Index (CTI) PLC value of a material is to be determined by test in accordance with UL 746A. This material characteristic is not dependent upon the minimum thickness at which the material is being used.

8.3 Insulating material, including barriers between parts of opposite polarity or material, subject to the influence of the arc formed by the opening of contacts, shall be acceptable for the particular application.

9 Current-Carrying Parts

9.1 Current-carrying parts shall be of silver, copper, a copper alloy, stainless steel or other metals such as plated iron or plated steel acceptable for the particular application with regard to plating, temperature, and other similar factors.

9.2 Unplated iron and steel used in bimetallic elements and heaters is not prohibited.

9.3 Current-carrying parts, including terminals, shall be secured to their supporting surfaces so that they are restricted from rotating or shifting in position when such motion results in reduction of spacings to less than those required elsewhere in this Standard. The security of contact assemblies shall be such as to provide for the continued alignment of contacts.

9.4 Friction between surfaces shall not be used as the sole means to restrict movement of current-carrying parts. Movement is to be restricted by use of:

- a) Two screws or rivets;
- b) Shoulder or mortises;
- c) Pin;
- d) Lug;
- e) Offset;
- f) Connecting strip or clip fitted to an adjacent part; or
- g) Some other equivalent method.