

UL 858A

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Safety-Related Solid-State Controls for Household Electric Ranges

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Underwriters Laboratories Inc. (UL)
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UL Standard for Safety for Safety-Related Solid-State Controls for Household Electric Ranges, UL 858A

Third Edition, Dated April 12, 2007

Summary of Topics

The Third Edition of UL 858A has been issued to reference Tests for Safety-Related Controls Employing Solid State Devices, UL 991, for common requirements; remove redundant UL 991 requirements, specifically the (a) Power Supply Interruption Test, (b) Transient Surge Tests, (c) Ramp Voltage Tests, (d) Electrostatic Discharge Tests, (e) Thermal Cycling Test, and (f) Shipping and Storage Test; and revise tests to include only the equipment settings and configurations specific to household electric ranges, specifically the (g) Transient Overvoltage Tests; (h) Electromagnetic Susceptibility Tests; and (i) Humidity Test.

The new and revised requirements are substantially in accordance with UL's Proposal(s) on this subject dated September 30, 2005, December 16, 2005, and July 14, 2006.

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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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that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

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

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1-34	April 12, 2007
A1-A2	April 12, 2007

April 12, 2007

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ANSI/UL 858A-2007

UL 858A

Standard for Safety-Related Solid-State Controls for Household Electric

Ranges

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Third Edition

April 12, 2007

The most recent designation of ANSI/UL 858A as an American National Standard (ANSI) occurred on April 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 Third Edition is under continuous maintenance, whereby each revision is ANSI approved upon publication.

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 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 safety-related solid-state controls used in household electric ranges. These requirements supplement and, in some cases, amend the requirements in the Standard for Household Electric Ranges, UL 858, the Standard for Temperature-Indicating and -Regulating Equipment, UL 873, and the Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991.

1.2 These requirements cover a solid-state control that performs any of the following functions:

- a) Controls cooktop heating elements.
- b) Controls oven normal operating temperatures.
- c) Controls oven self-cleaning cycle operating temperatures.
- d) Controls oven self-cleaning cycle door lock system.
- e) Controls required signal lights or audible alarms.
- f) Serves as a temperature-limiting control for any of the functions noted in (a) – (e).
- g) Controls a function essential for the appliance to comply with a specific requirement in the Standard for Household Electric Ranges, UL 858.

2 General Requirements

2.1 General

2.1.1 For the purpose of this standard, a control includes a complete control assembly, a subassembly, a circuit, or an individual component.

2.1.2 A description of the normal and intended operation of a control with respect to the controlled element shall be provided by the manufacturer and used as a guide for analysis and test purposes. For example, the description might state that the control is intended to monitor certain temperatures and disconnect the controlled element from the electrical supply when a higher predetermined temperature is attained.

2.1.3 When a control is intended to perform multiple protective functions (such as temperature-regulating, temperature-limiting, self-clean door lock control, and similar functions), the manufacturer is to identify those components or circuits that are involved in each protective function, and also any component or circuits that are common to multiple functions.

2.2 Components

2.2.1 Except as indicated in 2.2.2, 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 commonly used in the products covered by this standard.

2.2.2 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.

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

2.2.4 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.

2.3 Units of measurement

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

2.4 References

2.4.1 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.

3 Glossary

3.1 SUPERVISION – The monitoring of a circuit so that a malfunction results in a trouble indication.

3.2 THERMAL-LINK – A non-resettable device incorporating a thermal element which will open a circuit once only when exposed for a sufficient length of time to a temperature in excess of that which it has been designed.

3.3 TROUBLE INDICATION – An audible signal, which may be supplemented by a visual signal, intended to indicate a fault or trouble condition, such as the open-circuit or short-circuit of a component in the control or an open-circuit or short-circuit to grounded metal in the connected wiring.

INVESTIGATION

4 General Requirements

4.1 General

4.1.1 Unless otherwise specified in this standard, a solid-state control shall comply with the Standard for Solid-State Controls for Appliances, UL 244A.

4.1.2 A solid-state control shall comply with the applicable requirements in the Standard for Temperature-Indicating and -Regulating Equipment, UL 873.

4.1.3 A transient voltage suppression assembly supplied as part of a solid-state control shall comply with the Standard for Transient Voltage Surge Suppressors, UL 1449.

4.1.4 All solid-state controls are to be subjected to each of the following:

- a) The Environmental Stress Tests, Sections 9 – 15 and 17 – 19, in the Standard for Tests for Safety-Related Controls Employing Solid-State Devices, UL 991,
- b) The Power Cycling Test, Section 13,
- c) The Failure Mode and Effect Analysis, Section 6, and
- d) The Production Tests requirements specified in Section 14 in UL 858A and Supplement SA, in UL 991.

4.1.5 Other than indicated in 8.1.1, Demonstrated Test Method, Section 8, is to be conducted on each complete control assembly, subassembly, circuit, or individual component:

- a) That is critical,
- b) That is a required supervising circuit,
- c) The failure mode of which is undefined, as determined by the Failure Mode and Effect Analysis, or
- d) That performs a temperature-limiting function (See 5.2).

4.1.6 When a risk of fire is to be determined, a risk of fire test indicator is to be used that consists of two layers of cheesecloth draped over the control when the control alone is tested or over the complete appliance when the appliance is tested. Ignition of the cheesecloth is indication of a risk of fire. See 4.1.8.

4.1.7 The cheesecloth is to be bleached cotton cloth running 14 – 15 yd²/lb (26 – 28 m²/kg) and having what is known in the trade as a count of 32 by 28, that is, for any square inch, 32 threads in one direction and 28 threads in the other direction (for any square centimeter, 13 threads in one direction and 11 threads in the other direction). Tests involving cheesecloth are to be conducted in a closed draft-free room.

4.1.8 When a risk of shock is to be determined, a risk of shock test indicator is to be used that consists of a 3-A nontime-delay fuse connected in the grounding conductor of the supply to the control or to the product. Any neutral bonding conductor or strap is to be open-circuited. Opening of the fuse is indication of a risk of electric shock.

4.1.9 A control is able to be assigned one or two temperature ratings, $T_{\max}$ or T_a . $T_{\max}$ refers to the maximum control ambient temperature to which the control is intended to be exposed in the end-use application under any operating mode for which component temperature measurements are specified in the Standard for Household Electric Ranges, UL 858, and is used in conjunction with 8.2.5, 9.2, and 13.3. T_a refers to the control use ambient temperature and is the same as $T_{\max}$, unless the Exception to 8.2.4 is used.

4.1.10 When a control performs a safety-related function that is not specifically addressed in this standard, the criteria for identifying any critical components, Demonstrated Test Method test level, and usage level shall be determined by a separate investigation. Factors to be evaluated shall include:

- a) The severity of possible risks of electric shock, fire, and injury to persons resulting from a component failure,
- b) The extent and frequency of exposure to possible risks of electric shock, fire, and injury to persons,
- c) Whether or not a component malfunction directly results in a risk of electric shock, fire, or injury to persons,
- d) The extent of user involvement in initiating or reducing the risk of electric shock, fire, or injury to persons, or where additional abnormal conditions are required to exist, and
- e) Whether or not a control malfunction is evident to the user prior to the user being exposed to a risk of electric shock, fire, or injury to persons.

See 1.2(g).

4.2 Spacings

4.2.1 Spacings within a control shall be maintained in accordance with the spacing requirements in the Standard for Temperature-Indicating and -Regulating Equipment, UL 873.

Exception: Spacings within a control that are reduced in accordance with the applicable requirements in the Standard for Solid-State Controls for Appliances, UL 244A, comply with UL 873.

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4.3 Temperature test

4.3.1 A control shall comply with the temperature test requirements in the Standard for Temperature-Indicating and -Regulating Equipment, UL 873.

Exception No. 1: The temperature rise of a component or material that exceeds the maximum specified in UL 873, shall not exceed the maximum temperature rise specified in the Standard for Solid-State Controls for Appliances, UL 244A.

Exception No. 2: For a component or material for which a maximum temperature rise is not specified in UL 873, the maximum temperature rises specified in UL 244A shall be applicable. For a component or material for which no maximum temperature rise is specified in either UL 873 or UL 244A, the temperature limit shall be established by means of a separate investigation.

5 Limiting Controls

5.1 A limiting function shall be independent of any regulating function. A single component, including an electromechanical component, shall not be critical to both functions.

Exception No. 1: This requirement does not apply to a component that malfunctions and renders the control, or the external components controlled, totally inoperable or inoperable to the extent that it is not usable to perform any intended function and does not introduce a risk of fire, electric shock, or injury to persons.

Exception No. 2: This requirement does not apply when, with the component malfunctioned:

- a) The appliance complies with the applicable abnormal operation tests in the Standard for Household Electric Ranges, UL 858,*
- b) The activation of a trouble indication that complies with the requirements for Electrical Supervision, Section 7, results, and*
- c) A risk of fire, electric shock, or injury to persons is not introduced.*

5.2 In all cases, a solid-state limiting control is to be subjected to the Demonstrated Test Method, Section 8. For the Demonstrated Test Method, the test and usage levels assigned to a limiting function in a solid-state control are to be as specified in Table 5.1.

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