UL 82

STANDARD FOR SAFETY

Electric Gardening Appliances

UL Standard for Safety for Electric Gardening Appliances, UL 82

Ninth Edition, Dated August 31, 2017

Summary of Topics

This revision of ANSI/UL 82 dated May 14, 2021 is issued to clarify the application of test requirements to battery powered gardening appliances with respect to accessible parts and the mold stress test; SA2.2

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated January 15, 2021 and March 12, 2021.

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UL 82

Standard for Electric Gardening Appliances

First Edition – March, 1973
Second Edition – February, 1974
Third Edition – May, 1977
Fourth Edition – January, 1986
Fifth Edition – December, 1991
Sixth Edition – June, 1994
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Eighth Edition – August, 2011

Ninth Edition

August 31, 2017

This ANSI/UL Standard for Safety consists of the Ninth Edition including revisions through May 14, 2021.

The most recent designation of ANSI/UL 82 as an American National Standard (ANSI) occurred on May 7, 2021. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

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 https://csds.ul.com.

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PART 1 – ALL GARDENING APPLIANCES

INTRODUCTION

1 Scope

1.1 These requirements cover cord-connected, electrically-operated gardening appliances, such as cultivators, edger-trimmers, and the like, rated 250 volts or less for use in accordance the National Electrical Code, ANSI/NFPA 70.

1.2 These requirements also cover battery-operated gardening appliances covered in Battery Powered Gardening Appliances, Supplement SA of this Standard.

1.3 These requirements do not cover sprayers, foggers, or equipment for use in hazardous locations as defined in the National Electrical Code, ANSI/NFPA 70.

1.4 These requirements do not cover electrically operated walk-behind lawn mowers . These appliances are covered under UL 1447.

1.5 These requirements do not cover battery operated ride-on lawn mowers. These appliances are covered under UL 2753.

1.6 These requirements do not cover electrically operated hedge trimmers. These appliances are covered under UL 60745-2-15.

1.7 These requirements do not cover electrically operated log splitters.

2 Units of Measurements

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

2.2 Unless otherwise indicated, all voltage and current values specified in this Standard are root-mean-square.

3 References

3.1 Any undated reference to a code or standard appearing in the requirements in this standard shall be interpreted as referring to the latest edition of that code or standard.

ANSI Standards

ANSI B175.3
Internal Combustion Engine-Powered Hand-Held Grass Trimmers and Brushcutters – Safety and Environmental Requirements

ASTM Standards

ASTM E230/E23-0M
Specification and Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples

ASTM D257
Test Methods for DC Resistance or Conductance of Insulating Materials

IEC Standards

IEC 61000-4-5
Electromagnetic Compatibility (EMC) – Part 4-5: Testing and Measurement Techniques – Surge Immunity Test

ISO Standards

ISO 11684
Tractors, Machinery for Agriculture and Forestry, Powered Lawn and Garden Equipment – Safety Signs and Hazard Pictorials – General Principles

ISO 7010
Graphical Symbols – Safety Colours And Safety Signs – Registered Safety Signs

NFPA Standards

ANSI/NFPA 70
National Electrical Code

UL Standards

UL 20
General-Use Snap Switches

UL 44
Thermoset-Insulated Wires and Cables

UL 62
Flexible Cords and Cables

UL 66
Fixture Wire

UL 83
Thermoplastic-Insulated Wires and Cables

UL 94
Tests for Flammability of Plastic Materials for Parts in Devices and Appliances

UL 157
Gaskets and Seals

UL 224
Extruded Insulating Tubing

UL 244A
Solid-State Controls for Appliances

UL 248-1
Low-Voltage Fuses – Part 1: General Requirements

UL 248-5
Low-Voltage Fuses – Part 5: Class G Fuses

UL 310
Electrical Quick-Connect Terminals

UL 355
Cord Reels

UL 486A-486B
Wiring Connectors

UL 486C
Splicing Wiring Connectors

UL 486E
Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors

UL 489
Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures

UL 489A
Circuit Breakers For Use in Communications Equipment

UL 496
Lampholders

UL 498
Attachment Plugs and Receptacles

UL 507
Electric Fans

UL 508
Industrial Control Equipment

UL 510
Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape

UL 514A
Metallic Outlet Boxes

UL 514C
Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers

UL 514D
Cover Plates for Flush-Mounted Wiring Devices

UL 635
Insulating Bushings

UL 746A
Polymeric Materials – Short Term Property Evaluations

UL 746B
Polymeric Materials – Long Term Property Evaluations

UL 746C
Polymeric Materials – Use in Electrical Equipment Evaluations

UL 746D
Polymeric Materials – Fabricated Parts

UL 758
Appliance Wiring Material

UL 773A
Nonindustrial Photoelectric Switches for Lighting Control

UL 796
Printed-Wiring Boards

UL 810
Capacitors

UL 817
Cord Sets and Power-Supply Cords

UL 873
Temperature-Indicating and -Regulating Equipment

UL 917
Clock-Operated Switches

UL 935
Fluorescent-Lamp Ballasts

UL 943
Ground-Fault Circuit-Interrupters

UL 943B
Appliance Leakage-Current Interrupters

UL 969
Marking and Labeling Systems

UL 991
Tests for Safety-Related Controls Employing Solid-State Devices

UL 1004-1
Rotating Electrical Machines – General Requirements

UL 1004-2
Impedance Protected Motors

UL 1004-3
Thermally Protected Motors

UL 1004-7
Electronically Protected Motors

UL 1012
Power Units Other Than Class 2

UL 1029
High-Intensity Discharge Lamp Ballasts

UL 1053
Ground-Fault Sensing and Relaying Equipment

UL 1059
Terminal Blocks

UL 1077
Supplementary Protectors for Use in Electrical Equipment,

UL 1283
Electromagnetic Interference Filters

UL 1310
Class 2 Power Units

UL 1411
Transformers and Motor Transformers for Use in Audio-, Radio-, and Television-Type Appliances,

UL 1412
Fusing Resistors and Temperature-Limited Resistors for Radio- and Television-Type Appliances

UL 1434
Thermistor-Type Device

UL 1439
Tests for Sharpness of Edges on Equipment

UL 1441
Coated Electrical Sleeving

UL 1446
Systems of Insulating Materials – General

UL 1447
Electric Lawn Mowers

UL 1557
Electrically Isolated Semiconductor Devices

UL 1565
Positioning Devices

UL 1642
Lithium Batteries

UL 1699
Arc-Fault Circuit-Interrupters

UL 1977
Component Connectors for Use in Data, Signal, Control and Power Applications

UL 1998
Software in Programmable Components

UL 2111
Overheating Protection for Motors

UL 2459
Insulated Multi-Pole Splicing Wire Connectors

UL 2595
General Requirements for Battery-Powered Appliances

UL 2753
Outline of Investigation for Battery Operated Ride-On Lawn Mowers

UL 4248-1
Fuseholders – Part 1: General Requirements

UL 4248-9
Fuseholders – Part 9: Class K

UL 5085-1
Low Voltage Transformers – Part 1: General Requirements

UL 5085-2
Low Voltage Transformers – Part 2: General Purpose Transformers

UL 5085-3
Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers

UL 8750
Light Emitting Diode (LED) Equipment for Use In Lighting Products

UL 60691
Thermal-Links – Requirements and Application Guide

UL 60730-1
Automatic Electrical Controls – Part 1: General Requirements

UL 60730-2-2
Automatic Electrical Controls for Household and Similar Use; Part 2 Particular Requirements for Thermal Motor Protectors

UL 60730-2-6
Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Automatic Electrical Pressure Sensing Controls Including Mechanical Requirements

UL 60730-2-7
Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Timers and Time Switches

UL 60730-2-9
Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Temperature Sensing Controls

UL 60745-2-13
Hand-Held Motor-Operated Electric Tools – Safety – Part 2-13: Particular Requirements for Chain Saws

UL 60745-2-15
Hand-Held Motor-Operated Electric Tools – Safety – Part 2-15: Particular Requirements for Hedge Trimmers

UL 61058-1
Switches for Appliances – Part 1: General Requirements

UL 61800-5-1
Adjustable Speed Electrical Power Drive Systems – Part 5-1: Safety Requirements – Electrical, Thermal, and Energy

4 Glossary

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

4.2 ACCESSIBLE PART – A part so located that it can be contacted by a person, either directly or by means of a probe or tool, or that is not recessed the required distance behind an opening. See Accessibility of Moving Parts, Section 9.

4.3 APPLIANCE COUPLER – A single-outlet, female contact device for attachment to a flexible cord as part of a detachable power-supply cord to be connected to an appliance inlet (motor attachment plug).

4.4 APPLIANCE INLET (Motor Attachment Plug) – A male contact device mounted on an end product appliance to provide an integral blade configuration for the connection of an appliance coupler or cord connector.

4.5 APPLIANCE (FLATIRON) PLUG – An appliance coupler type of device having a cord guard and a slot configuration specified for use with heating or cooking appliances.

4.6 AUTOMATICALLY CONTROLLED PRODUCT – A product is determined to be automatically controlled if it complies with one or more of the following conditions:

a) The repeated starting of the product is independent of any manual control after one complete cycle of operation, after which some form of limit device opens the circuit;

b) During any single preset cycle of operation, the motor is caused to stop and restart;

c) When the product is energized, the initial starting of the motor may be intentionally delayed beyond intended, conventional starting; and

d) For a product employing a motor with a separate starting winding, during any single predetermined cycle of operation, automatic changing of the mechanical load reduces the motor speed sufficiently to reestablish starting-winding connections to the supply circuit.

4.7 BASIC INSULATION – The insulation applied to live parts to provide basic protection against electric shock.

4.8 COMPONENT – A device or fabricated part of the appliance covered by the scope of a standard dedicated to the purpose. When incorporated in an appliance, equipment otherwise typically field installed (e.g. luminaire) is considered to be a component. Unless otherwise specified, materials that compose a device or fabricated part, such as thermoplastic or copper, are not considered components.

4.9 CONTROL, AUTOMATIC ACTION – A control in which at least one aspect is non-manual.

4.10 CONTROL, AUXILIARY – A device or assembly of devices that provides a functional utility, is not relied upon as an operational or protective control, and therefore is not relied upon for safety. For example, an efficiency control not relied upon to reduce the risk of electric shock, fire, or injury to persons during normal or abnormal operation of the end product is considered an auxiliary control.

4.11 CONTROL, MANUAL – A device that requires direct human interaction to activate or rest the control.

4.12 CONTROL, OPERATING – A device or assembly of devices, the operation of which starts or regulates the end product during normal operation. For example, a thermostat, the failure of which a thermal cutout/limiter or another layer of protection would mitigate the risk of electric shock, fire, or injury to persons, is considered an operating control. Operating controls are also referred to as “regulating controls”.

4.13 CONTROL, PROTECTIVE – A device or assembly of devices, the operation of which is intended to reduce the risk of electric shock, fire or injury to persons during normal and reasonably anticipated abnormal operation of the appliance. For example, a thermal cutout/limiter, or any other control/circuit relied upon for normal and abnormal conditions, is considered a protective control. Protective controls are also referred to as “limiting controls” and “safety controls”. During the evaluation of the protective control / circuit, the protective functions are verified under normal and single-fault conditions of the control.

4.14 CONTROL, TYPE 1 ACTION – The actuation of an automatic control for which the manufacturing deviation and the drift (tolerance before and after certain conditions) of its operating value, operating time, or operating sequence has not been declared and tested under this Standard.

4.15 CONTROL, TYPE 2 ACTION – The actuation of an automatic control for which the manufacturing deviation and the drift (tolerance before and after certain conditions) of its operating value, operating time, or operating sequence have been declared and tested under this Standard.

4.16 CORD CONNECTOR – A female contact device wired on flexible cord for use as an extension from an outlet to make a detachable electrical connection to an attachment plug or, as an appliance coupler, to an equipment inlet.

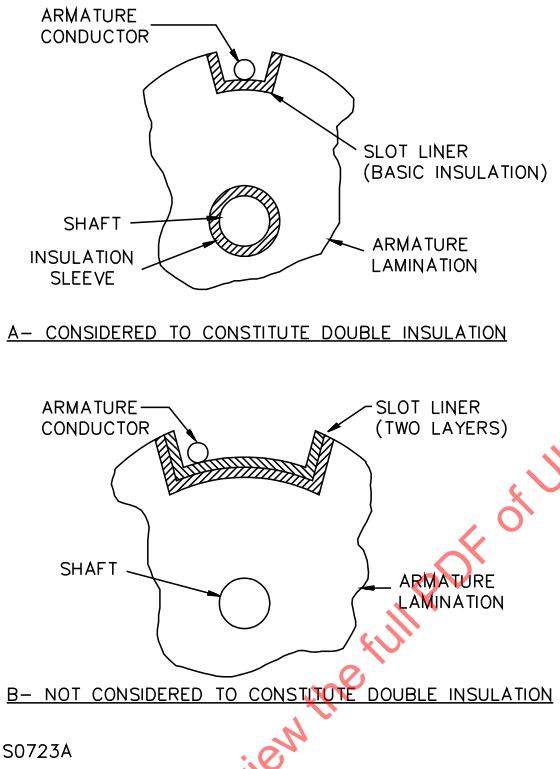
4.17 CUTTER AREA – The area through which the cutting means moves and in which a foreign object may be struck by the cutting means.

4.18 DEAD-MAN CONTROL – A control intended to automatically interrupt power when the actuating force supplied by the operator is removed.

4.19 DOUBLE INSULATION – An insulation system comprised of basic insulation and supplementary insulation, with the two insulations physically separated and so arranged that they are not simultaneously subjected to the same deteriorating influences, such as temperature, contaminants, and the like, to the same degree. See Figure 4.1.

Figure 4.1

Example of double insulation



4.20 ENCLOSURE – That portion of an appliance that:

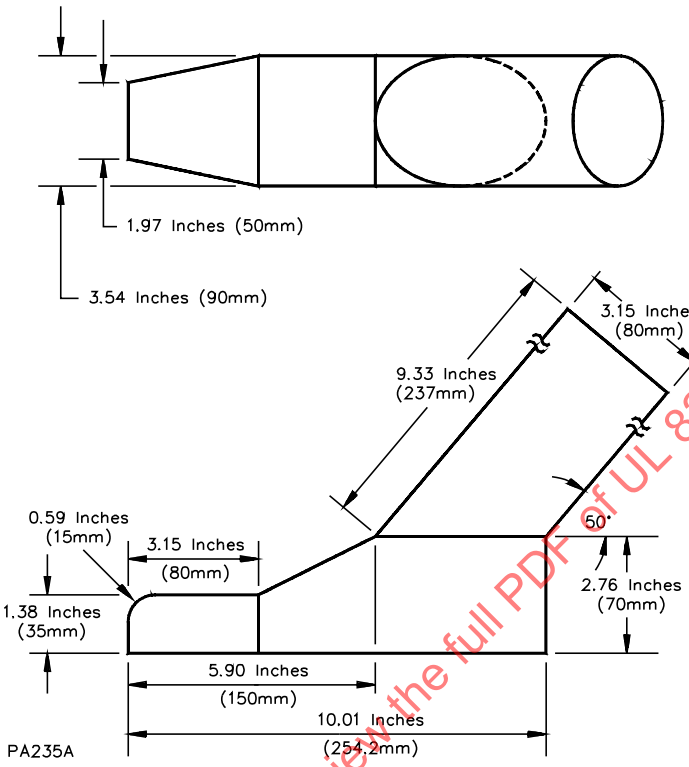
a) Renders all or any part that may otherwise present a risk of electric shock or injury to persons inaccessible; or

b) Prevents propagation of flame initiated by electrical disturbances occurring within the appliance.

4.21 FOOT PROBE – A simulated human foot. See Figure 4.2, for dimensional details.

Figure 4.2

Foot probe



4.22 GROUND-SUPPORTED APPLIANCE – An appliance that, during normal operation, is supported entirely or in part by the ground.

4.23 GUARD – A part of an assembly provided for shielding parts that may present a risk of fire, electric shock, or injury to persons.

4.24 HAND-SUPPORTED APPLIANCE – An appliance that, during normal operation, must be completely supported by the user.

4.25 LEAKAGE CURRENT – All current or currents, including capacitively-coupled currents, that may be conveyed between exposed conductive surfaces of an appliance and ground or other exposed conductive surfaces of the appliance.

4.26 LIVE PART – A part energized with respect to earth or energized with respect to some other part.

4.27 OPERATOR CONTROL – Any device necessary for operating an appliance including a drive-engaging control, a movable-guide control, a drive-speed changing control, and a deflector control.

4.28 POLE PRUNER – hand supported pole-mounted appliance fitted with a saw chain cutting attachment mounted on a pole for pruning branches and having a bar not greater than 10.24 inch (260 mm).

4.29 PRUNERS – A hand-supported gardening appliance intended for one hand use and used primarily to cut off small twigs and branches of trees and shrubs.

4.30 REINFORCED INSULATION – An improved basic insulation with such mechanical and electrical qualities that it, in itself, provides the same degree of protection against electric shock as double insulation. It may consist of one or more layers of insulating material.

4.31 SUPPLEMENTARY INSULATION – An independent insulation provided in addition to the basic insulation to protect against electric shock in case of mechanical rupture or electrical breakdown of the basic insulation. An enclosure of insulating material may form a part or the whole of the supplementary insulation.

CONSTRUCTION

5 Components

5.1 General

5.1.1 A component of a product covered by this Standard shall:

a) Comply with the requirements for that component as indicated in Sections 5.2 – 5.23;

b) Be used in accordance with its rating established for the intended conditions of use;

c) Be used within its established use limitations or conditions of acceptability; and

d) Not contain mercury.

Exception No. 1: A component of a product covered by this Standard is not required to comply with a specific component requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product;

b) Is superseded by a requirement in this Standard; or

c) Is separately evaluated when forming part of another component, provided the component is used within its established ratings and limitations.

Exception No. 2: A component that complies with a UL component standard other than those specified in Sections 5.2 – 5.23, is acceptable if:

a) The component also complies with the applicable component standard specified in Sections 5.2 – 5.23; or

b) The component standard:

1) Is compatible with the ampacity and overcurrent protection requirements in ANSI/NFPA 70 where appropriate;

2) Considers long-term thermal properties of polymeric insulating materials in accordance with UL 746B; and

3) Any use limitations of the other component UL standards are identified and appropriately accommodated in the end use application. For example, a component used in a household application, but intended for industrial use and that complies with the relevant component standard may assume user expertise not common in household applications.

5.1.2 A component that is also intended to perform other functions, such as over current protection, ground-fault circuit-interruption, surge suppression, any other similar functions, or any combination thereof, shall comply additionally with the requirements in the applicable UL standard that cover devices that provide those functions.

Exception: Where these other functions are not required for the application and not identified as part of markings, instructions, or packaging for the appliance, the additional component UL standard is not required to be applied.

5.1.3 A component not anticipated by the requirements in this Standard, not specifically covered by the component standards specified in Sections 5.2 – 5.23, and that involves a risk of electric shock, fire, or personal injury, shall be additionally evaluated in accordance with the applicable UL standard, and shall comply with 5.1.1 (b) – (d).

5.1.4 With regard to a component being additionally evaluated, reference to construction and performance requirements in another UL end product standard is appropriate where that standard anticipates normal and abnormal use conditions consistent with the application of the requirements in this standard.

5.2 Attachment plugs, receptacles, connectors, and terminals

5.2.1 Attachment plugs, receptacles, appliance couplers, appliance inlets (motor attachment plugs), and appliance (flatiron) plugs, shall comply with UL 498. See 5.2.9.

Exception No. 1: Attachment plugs and appliance couplers integral to cord sets or power supply cords are evaluated in accordance with UL 817, and is not required to comply with UL 498.

Exception No. 2: A fabricated pin terminal assembly is not required to comply with UL 498, if it complies with Live Parts, Section 14; Electric Insulation, Section 16; and Spacings, Section 22.

5.2.2 Quick-connect terminals, both connectors and tabs, for use with one or two 22 – 10 AWG copper conductors, having nominal widths of 0.110 in (2.8 mm), 0.125 in (3.2 mm), 0.187 in (4.8 mm), 0.205 in (5.2 mm), and 0.205 in (6.3 mm), intended for internal wiring connections in appliances, or for the field termination of conductors to appliance, shall comply with UL 310.

Exception: Other sizes of quick-connect terminals shall be evaluated with respect to crimp pull out, insertion-withdrawal, temperature rise, and all tests shall be conducted in accordance with UL 310.

5.2.3 Single and multi-pole connectors for use in data, signal, control and power applications within and between electrical equipment, and that are intended for factory assembly to copper or copper alloy conductors, or for factory assembly to printed-wiring boards, shall comply with UL 1977. See 5.2.9.

5.2.4 Wire connectors shall comply with UL 486A-486B.

5.2.5 Splicing wire connectors shall comply with UL 486C.

5.2.6 Multi-pole splicing wire connectors that are intended to facilitate the connection of hard-wired utilization equipment to the branch-circuit conductors of buildings shall comply with UL 2459. See 5.2.9.

5.2.7 Equipment wiring terminals for use with all alloys of copper, aluminum, or copper-clad aluminum conductors, shall comply with UL 486E.

5.2.8 Terminal blocks shall comply with UL 1059, and, if applicable, be suitably rated for field wiring.

Exception: A fabricated part performing the function of a terminal block is not required to comply with UL 1059 if the part complies with the requirements in Live Parts, Section 14; Electrical Insulation, Section 16; and Spacings, Section 22, of this end product Standard. This exception does not apply to protective conductor terminal blocks.

5.2.9 Female devices (such as receptacles, appliance couplers, and connectors) that are intended, or that may be used, to interrupt current in the end product, shall be suitably rated for current interruption of the specific type of load, when evaluated with its mating plug or connector. For example, an appliance coupler that can be used to interrupt the current of a motor load shall have a suitable horsepower rating when tested with its mating plug.

5.3 Batteries

5.3.1 Rechargeable lithium ion (Li-ion) cells shall comply with the requirements for secondary lithium cells specified in UL 1642.

5.4 Boxes and raceways

5.4.1 Electrical boxes and the associated bushings and fittings, and raceways, of the types specified in Wiring Methods and Materials, of the ANSI/NFPA 70, and that comply with the relevant UL standard (such as UL 514A; UL 514C; and UL 514D) and Components – General, Section 5.1, are considered to comply with the requirements in this Standard.

5.5 Capacitors and filters

5.5.1 The component requirements for a capacitor are not specified. A capacitor that complies with UL 810, is considered to comply with the requirements in 20.1.

5.5.2 Electromagnetic interference filters with integral enclosures that comply with UL 1283, are considered to comply with the requirements in 20.1.

5.6 Controls

5.6.1 General

5.6.1.1 Auxiliary controls shall be evaluated using the applicable requirements in this end product Standard and the requirements in Controls – End Product Test Parameters, Section 25.

5.6.1.2 Operating (regulating) controls shall be evaluated using the applicable component standard requirements specified in 5.6.2 – 5.6.7, and if applicable, the requirements in Controls – End Product Test Parameters, Section 25, unless otherwise specified in this end product Standard.

5.6.1.3 Operating controls that rely upon software for the normal operation of the end product where deviation or drift of the control may result in a hazard, such as a speed control unexpectedly changing its output, shall comply with UL 991 and UL 1998, or UL 60730-1, or both.

5.6.1.4 Protective (limiting) controls shall be evaluated using the applicable component standard requirements specified in Sections 5.6.2 – 5.6.7, and if applicable, the parameters in Controls – End Product Test Parameters, Section 25, unless otherwise specified in this end product Standard.

5.6.1.5 Solid-state protective controls that do not rely upon software as a protective component shall comply with UL 991 or UL 60730-1 (except for the Controls Using Software requirements in Annex H), or both